



DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)

Course Code: 1220

2011-2012

L - SCHEME



DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY (SEMESTER SYSTEM)

(Implemented from 2011- 2012)

L – SCHEME

<u>REGULATIONS</u>*

* Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.

1. Description of the Course:

a. Full Time (3 years)

The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters^{*} and the First Year is common to all Engineering Branches.

b. Sandwich (3¹/₂ years)

The Course for the Sandwich Diploma in Engineering shall extend over a period of three and half academic years, consisting of 7 semesters^{*} and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.

During 4th and/or during 7th semester the students undergo industrial training for six months/ one year. Industrial training examination will be conducted after completion of every 6 months of industrial training

c. Part Time (4 years)

The course for the Part Time Diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters^{*}, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

Each Semester will have 16 weeks duration of study with 35 hrs. /Week for Regular Diploma Course and 18 hrs. / Week for Part-Time Diploma Course.

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2011 – 2012 academic year onwards.

2. Condition for Admission:

Condition for admission to the Diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education, Tamilnadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamilnadu

(Or) The Matriculation Examination of Tamil Nadu. (Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamilnadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic)# or (Vocational) courses mentioned in the Higher Secondary Schools in Tamilnadu affiliated to the Tamilnadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects

0		H.Sc Academic	H.Sc Vocational			
SI.	Courses	Subjects Studied	Subjects Studied			
INU		Subjects Studied	Related subjects	Vocational subjects		
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical		
2.	Diploma Course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretary ship.		

Subject to the approval of the AICTE

• For the Diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practicals may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.
- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.
- Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.
- 4. Age Limit:No Age limit.

5. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamilnadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given Below:

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time(Lateral Entry)	2 Years	5 Years
Sandwich	3 ¹ / ₂ Years	61/2 Years
Part Time	4 Years	7 Years

6. Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects. The curriculum outline is given in Annexure - I

7. Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Board Examination.

8. Continuous Internal Assessment:

A. For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

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5 Marks

i) Subject Attendance 5 M (Award of marks for subject attendance to each subject Theory/Practical will be as per the range given below)

80%	-	83%	1	Mark	
84%	-	87%	2	Marks	
88%	-	91%	3	Marks	
92%	-	95%	4	Marks	
96%	-	100%	5	Marks	

ii) Test

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to:

The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to :

Total 10 marks

05 marks

05 marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6 th week	50	2 Hrs
Test II	Unit – III & IV	End of 12 th week	50	2 Hrs
Test III	Model Examination - Compulsory Covering all the 5 Units. (Board Examinations-question paper-pattern).	End of 16 th week	75	3 Hrs

- From the Academic year 2011-2012 onwards.

Question Paper Pattern for the Periodical Test :(Test - I & Test- II)

	Total	50 marks
(OR)	3 Questions X 12 marks	
	6 Questions X 6 marks	 36 marks
	14 Questions X 1 mark	 14 marks

iii) Assignment

10 Marks

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and Assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

10 Marks

B. For Practical Subjects:

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

a)	Attendance	:	5	Marks (Award of marks same as theory subjects)
b)	Procedure/ observation and tabulation/			
	Other Practical related Work	:	10	Marks
c)	Record writing	:	10	Marks
	TOTAL	:	25	Marks

- All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Board examinations.
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)
- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.
- All the marks awarded for assignments, Tests and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.

9. Communication and Life Skills Practical:

The Communication and Life Skills Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering. Much Stress is given on:

- Monodic Communication
- Dyadic Communication
- Professional Communication
- Pronunciation
- Writing Resumes
- Interview Techniques
 Sessional Mark

..... 25 Marks

10. Project Work:

The students of all the Diploma Courses (except Diploma in Modern Office Practice) have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. The Project work must be reviewed twice in the same semester.

a) Internal assessment mark for Project Work & Viva Voce:

Project Review I	 10 marks
Project Review II	 10 marks
Attendance	 05 marks (Award of marks same as theory Subject pattern)
Total	 25 marks
lotal	

Proper record to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work & Viva Voce in Board Examinations:

Viva Voce	 25 marks
Demonstration/Presentation	 20 marks
Total	 45 marks

c) Written Test Mark (from 3 topics for 1 hour duration): ^{\$}

i) Entrepreneurship	5 questions X 2 marks	=	10 marks
ii)Environment Management	5 questions X 2 marks	=	10 marks
iii)Disaster Management	5 questions X 2 marks	=	10 marks
			 30 marks

 \$ - Selection of Questions should be from Question Bank, by the External Examiner. No choice need be given to the candidates.

Project Work & Viva Voce in Board		 45 Marks
Examination		
Written Test Mark (from 3 topics for 1 ho duration)	our	 30 Marks
	TOTAL	 75 Marks

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Viva Voce Board examination.

11. Scheme of Examinations:

The Scheme of examinations for subjects is given in Annexure - II.

12. Criteria for Pass:

 No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum. 2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than 40% in theory subjects and 50% in practical subjects out of the total prescribed maximum marks including both the Internal Assessment and the Board Examinations marks put together, subject to the condition that he/she secures at least a minimum of 30 marks out of 75 marks in the Board Theory Examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.

13. Classification of successful candidates:

Classification of candidates who passed out the final examinations from April 2014 onwards (Joined in first year in 2011-2012) will be done as specified below.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate marks in all semesters put together except I and II semesters and passes all the above semesters in the first appearance itself and completes all subjects including that of I & II semesters within the stipulated period of study 3/2/4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all semesters put together except I & II semesters and completes all subjects including that of the I & II semesters within the stipulated period of study $3/3\frac{1}{2}/4$ years (Full Time/Sandwich/Part Time) without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class**.

The above mentioned classifications are also applicable for the Sandwich / Part-Time students who passed out Final Examination from October 2014 /April 2015 onwards (both joined in First Year in 2011-2012)

14. <u>Duration of a period in the Class Time Table:</u>

The duration of each period of instruction is1 hour and the total period of instruction hours excluding interval and Lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

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Chairperson Thiru.Ramesh Chand Meena, I.A.S

Commissioner of Technical Education Directorate of Technical Education Chennai-600025

Co-ordinator B.Nandagopal, Principal, Murugappa Polytechnic College, Avadi, Chennai – 600 062 Convener V.K.Venkateswaran, Principal Institute of Tool Engineering Dindigul-624003

Members

- S.Thiyagarajan, Chairman, M/S Mudra Fine Blanc(P) Limited, SIPCOT Industrial Estate, Sriperumpudur.
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- 3. S.K.A.Somaraj, HOD/TDM, Murugappa Polytechnic College, S.M.Nagar, Ch – 62
- **4. V.Selvaraj**, Senior Technical Officer (Retired), Central Institute of Plastic Engineering and Technology (CIPET), Chennai – 32.
- D.Mohan, Assistant Professor Central Institute of Plastic Engineering and Technology (CIPET), Chennai – 32
- 6. G.Mahendran, HOD/UG VSVN Polytechnic College, Virudhunagar.
- 7. S.Selvaraj, Senior Lecturer/TDM Murugappa Polytechnic College, S.M.Nagar, Ch – 62
- 8. C.Kathirvel, HOD/Tool & Die, R.V.S.Polytechnic College, Dindigul - 624 005.

SALIENT FEATURES OF L SCHEME CURRICULUM AND SYLLABUS OF II & III YEAR DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE) COURSE

- 1. In the previous schemes ie., up to K scheme, there were six subjects only in each semesters from III to VI semester. Now in this L scheme there are seven subjects per semester.
- 2. Computer application Practical in III semester and Communication and life skills lab in V Semester are introduced in this scheme to give the basic computer application knowledge and to enhance the communication and survival skill of the students respectively.
- 3. In K scheme, Machine drawing manual drafting and computer aided drafting were combined and taught in III semester as a single subject. Now in this L scheme the manual drafting will be taught in the III semester and Computer aided machine drawing will be taught in IV semester so that students will have better exposure to the manual as well as computer aided drafting techniques.

SI.No	Name of the Subject	Theory / Practical	Semester in which introduced	Reason for Introduction
i.	Fluid Power and Thermal Engineering	Theory	IV	Being a Mechanical Engineer it is absolutely essential to have basic knowledge on Properties of fluids, Fluid power, Thermal engineering and basic heat transfer concepts. More over this will increase the ability of the students writing competitive examinations and aiming for higher studies.
11.	Hydraulics and Pneumatics Practical	Practical	IV	Nowadays Industrial automation is done mostly with hydraulic/pneumatic / Hydro pneumatic equipments. Hence exposure to the basic hydraulic/pneumatic components, circuits, their functioning is essential to keep pace with the present day industrial demand. Hence included.

4. The following new subjects are introduced in this scheme:

iii.	Tool Design and Drawing	Theory	V	Tool Design is one of the potential areas of employment for the Tool & Die diploma holders. Hence to have thorough knowledge in the basics of tool design, this subject is included.
iv.	Computer Integrated Manufacturing practical	Practical	VI	Nowadays all the manufacturing companies are using the CNC technology extensively. Hence to train the students in programming, setting and operation of CNC machine to produce a component, this subject is included as it is essential and need of the hour.

- 5. In K scheme there were two theory subjects Viz., Machine Shop Technology (MST) and Tool Room Special Machines (TRSM) both meant for teaching the construction and working principle of the various special machines used in machine shop and tool room. As these two areas are almost similar, these two subjects are combined and named as TOOL ROOM SPECIAL MACHINES in this L scheme, without excluding any essentials but deleting the obsolete techniques / technology.
- 6. Other Changes incorporated comparing to K Scheme:
 - i. The title of the subject Mechanics of Materials in III semester is renamed as Strength of materials.
 - ii. The title of the subject Manufacturing Processes in III semester is renamed as Manufacturing Technology.
 - iii. Considering the importance and volume of practical work in the subject Press Tool Making practical in K Scheme, now it is split in to two practical subjects Viz., Manufacture of Press Tools-I Practical in V semester and Manufacture of Press Tools-II Practical in VI Semester.
 - iv. Considering the employment potential in the field of Die maintenance, four practical exercises, two each in the Press Tools I & II practical are newly introduced in this scheme.
 - v. In the subject Manufacturing Technology practical in III semester, the exercises in lathe are systematically arranged so that there will be optimum use of Raw material.
 - vi. In all the theory and practical subjects, to the possible extent, obsolete technique / technologies have been removed and the latest one is included.

<u>ANNEXURE – I</u>

Diploma in Mechanical Engineering (Tool&Die) L-Scheme (With effect from 2011-2012)

CURRICULUM OUTLINE

THIRD SEMESTER

Subject		HOURS PER WEEK					
Code	Code SUBJECT Theory		Tutorial / Drawing	Practical	Total		
22031	Strength of Materials ^{@@}	6	-	-	6		
22232	Manufacturing Technology	5	-	-	5		
22233	Engineering Metrology	5	-	-	5		
22034	Machine Drawing ^{@@}	-	6	-	6		
22235	Engineering Metrology Practical	-	-	4	4		
22236	Manufacturing Technology Practical	-	-	5	5		
20001	Computer Applications Practical ^{\$\$}			4	4		
	TOTAL	16	6	13	35		

FOURTH SEMESTER

Subject		HOURS PER WEEK				
Code	SUBJECT	Theory	Tutorial / Drawing	Practical	Total	
22241	Engineering Materials and Metallurgy	5	-	-	5	
22242	Fluid Power and Thermal Engineering	5 -		-	5	
22243	Tool Room Special Machines	5	-	-	5	
22044	Computer Aided Machine Drawing Practical ^{@@}	-	-	5	5	
22245	Mechanical Material Testing Practical	-	-	4	4	
22246	Hydraulics and Pneumatics Practical	-	-	5	5	
22247	Tool Room Special Machines Practical	-	-	6	6	
	TOTAL	15	-	20	35	

CURRICULUM OUTLINE

FIFTH SEMESTER

Subject		HOURS PER WEEK					
Code	SUBJECT	Theory	Tutorial / Drawing	Practical	Total		
22251	Jigs, Fixtures and Gauges	5	-	-	5		
22252	Press Tools	5	-	-	5		
22253	Forging Dies and Die casting dies	5	-	-	5		
22254	Tool Design and Drawing	-	6	-	6		
22255	Press Tools - I Practical	-	-	6	6		
22256	Jigs and Fixtures Practical	-	-	4	4		
20002	Communication and Life Skills Practical ^{\$\$}	-	-	4	4		
	TOTAL	15	6	14	35		

SIXTH SEMESTER

Subject		HOURS			
Code	SUBJECT	Theory	Tutorial / Drawing	Practical	Total
22061	Industrial Engineering and Management ^{@@}	5	-	-	5
22062	Computer Integrated Manufacturing ^{@@}	5	-	-	5
22263	Plastic Moulding Technology	5	-	-	5
22064	Computer Integrated Manufacturing Practical ^{@ @}	-	-	6	6
22265	Press tools – II Practical	-	-	4	4
22266	Plastic Moulds Practical	-	_	4	4
22267	Project Work	-	_	6	6
	TOTAL	15	-	20	35

@ @ - Subjects Common with Diploma course in Mechanical Engineering .
 \$\$ - Subjects Common with other Diploma courses in Engineering.

<u>ANNEXURE – II</u> Diploma in Mechanical Engineering (Tool&Die) <u>L-Scheme (With effect from 2011-2012)</u> <u>SCHEME OF THE EXAMINATION</u>

THIRD SEMESTER

			Marks			
Subject Code	SUBJECT	Internal assess- ment	Board Exam.	Total	Minimu for pas	Duratic of Exal Hours
22031	Strength of Materials ^{@@}	25	75	100	40	3
22232	Manufacturing Technology	25	75	100	40	3
22233	Engineering Metrology	25	75	100	40	3
22034	Machine Drawing ^{@@}	25	75	100	40	3
22235	Engineering Metrology Practical	25	75	100	50	3
22236	Manufacturing Technology Practical	25	75	100	50	3
20001	Computer Applications Practical ^{\$\$}	25	75	100	50	3
				700		

FOURTH SEMESTER

			s:	n m s		
Subject Code	SUBJECT	Internal assess- ment	Board Exam	Total	Minimu for pas	Duratic of Exal Hours
22241	Engineering Materials and Metallurgy	25	75	100	40	3
22242	Fluid Power and Thermal Engineering	25	75	100	40	3
22243	Tool Room Special Machines	25	75	100	40	3
22044	22044 Computer Aided Machine Drawing Practical ^{@@}		75	100	50	3
22245	Mechanical Material Testing Practical	25	75	100	50	3
22246	Hydraulics and Pneumatics Practical	25	75	100	50	3
22247	Tool Room Special Machines Practical	25	75	100	50	3
	TOTAL			700		

SCHEME OF THE EXAMINATION

FIFTH SEMESTER

			Marks			
Subject Code	SUBJECT	Internal assess- ment	Board Exam.	Total	Minimu for pas	Duratic of Exal Hours
22251	Jigs, Fixtures and Gauges	25	75	100	40	3
22252	Press Tools	25	75	100	40	3
22253	Forging Dies and Die casting dies	25	75	100	40	3
22254	Tool Design and Drawing	25	75	100	40	3
22255	Press Tools - I Practical	25	75	100	50	16
22256	Jigs and Fixtures Practical	25	75	100	50	16
20002	Communication and Life Skills Practical	25	75	100	50	3
				700		

SIXTH SEMESTER

		Exami	Examination Marks			<u>ہ</u> ع
Subject Code	SUBJECT	Internal assess- ment	Board Exam	Total	Minimu for pas	Duratic of Exal Hours
22061	Industrial Engineering and Management ^{@@}	25	75	100	40	3
22062	Computer Integrated Manufacturing ^{@@}	25	75	100	40	3
22263	Plastic Molding Technology	25	75	100	40	3
22064	Computer Integrated Manufacturing Practical ^{@@}	25	75	100	50	3
22265	Press tools – II Practical	25	75	100	50	16
22266	Plastic Moulds Practical	25	75	100	50	16
22267	Project Work	25	75	100	50	3
	TOTAL			700		

@ @ - Subjects Common with Diploma course in Mechanical Engineering .
 \$\$ - Subjects Common with other Diploma courses in Engineering

Diploma in Mechanical Engineering (Tool & Die)

List of Alternative Subjects for K-Scheme subjects

		K - SCHEME		L-SCHEME					
	Subject		Subject						
S.No.	Code	Name of the Subject	Code	Name of the Subject					
1.	12031	Mechanics of Materials ^{@@}	22031	Strength of Materials ^{@@}					
2.	12032	Manufacturing Processes ^{@@}	22041	Manufacturing Technology-I					
3.	12234	Engineering Metrology	22233	Engineering Metrology					
4.	12034	Machine Drawing & CAD ^{@@}	22044	Computer Aided Machine Drawing Practical ^{@@}					
			22235	Engineering Metrology					
5.	12235	Metrology lab.		Practical					
		Workshop – I (Smithy, Foundry &	22045	Manufacturing Technology –I					
6.	12036	Welding) ^{@@}		Practical					

III SEMESTER

IV SEMESTER

		K - SCHEME		L-SCHEME
	Subject		Subject	
S.No.	Code	Name of the Subject	Code	Name of the Subject
1.	12241	Engineering Materials and Metallurgy	22241	Engineering Materials and Metallurgy
2.	12042	Machine Shop Technology ^{@@}	22052	Manufacturing Technology-II
3.	12243	Tool room special machines	22243	Tool Room Special Machines
		Mechanical Material Testing	22245	Mechanical Material Testing
4.	12244	Lab		Practical
		Tool Room Special Machines	22247	Tool Room Special Machines
5.	12245	Practical		Practical
		Workshop _ II (Turning, Drilling		
6.	12046	& Shaping) ^{^{ww}}		No alternate subject in L scheme

V SEMESTER								
•		K - SCHEME		L-SCHEME				
	Subject		Subject					
S.No.	Code	Name of the Subject	Code	Name of the Subject				
		Design of Jigs, Fixtures and	22251	Jigs, Fixtures and Gauges				
1.	12251	Gauges						
2.	12252	Design of Press Tools	22252	Press Tools				
3.	12253	Design of forging dies and Die casting dies	22253	Forging Dies and Die casting dies				
		English Communication	20002	Communication & Life Skills				
4.	11011	Practical ^{\$\$}		Practical ^{\$\$}				
5.	12255	Press Tools making Practical	22255	Press Tools - I Practical				
6.	12256	Jigs and Fixtures Practical	22256	Jigs and Fixtures Practical				

VI SEMESTER

		K - SCHEME		L-SCHEME
	Subject		Subject	
S.No.	Code	Name of the Subject	Code	Name of the Subject
1.	12061	Industrial Engineering & Management ^{@@}	22061	Industrial Engineering and Management ^{@@}
2.	12062	Computer Aided Design & Manufacturing ^{@@}	22062	Computer Integrated Manufacturing ^{@@}
3.	12263	Plastic Moulding Technology	22263	Plastic Moulding Technology
4.	12064	Computer Aided Design & Manufacturing Practical	22064	Computer Integrated Manufacturing Practical ^{@@}
5.	12265	Plastic Mould making Practical	22266	Plastic Moulds Practical
6.	12266	Project work, Entrepreneurship, Environmental & Disaster Management	22267	Project Work

@ @ - Subjects Common with Diploma course in Mechanical Engineering .
 \$\$ - Subjects Common with other Diploma courses in Engineering





DIPLOMA IN MECHANICAL ENGINEERING (TOOL&DIE)

L - SCHEME 2011 - 2012

22031 - STRENGTH OF MATERIALS

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22031
Semester	:	III
Subject Title	:	STRENGTH OF MATERIALS

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instr	uctions	Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
Strength of Materials	6	06	Internal Assessment	Board Examination	Total	3 Hrs
	O O	6 96	25	75	100	

Topics and Allocation of Hours:

Unit No	Topics	Hours
I	DEFORMATION OF METALS	18
II	GEOMETRICAL PROPERTIES OF SECTIONS AND THIN SHELLS	18
III	LATERAL DEFORMATION (SF AND BM DIAGRAMS, DEFLECTION OF BEAMS)	18
IV	THEORY OF SIMPLE BENDING AND FRICTION	18
V	TORSION AND SPRINGS	18
	REVISION AND TEST	6
	Total	96

RATIONALE:

Day by day, engineering and technology experience tremendous growth. Design plays a major role in developing engineering and technology. Strength of material is backbone for design. The strength of material deals generally with the behaviour of objects, when they are subject to actions of forces. Evaluations derived from these basic fields provide the tools for investigation of mechanical structure.

OBJECTIVES:

- Define various mechanical properties of materials.
- Calculate the deformation of materials, which are subjected to axial load and shear.
- Determine the moment of Inertia of various sections used in industries.
- Estimate the stresses induced in thin shells.
- Draw the Graphical representation of shear force and bending moment of the beam
 - subjected to different loads.
- Construct SFD and BMD.
- Calculate the power transmitted by the solid & hollow shafts.
- Distinguish different types of spring and their applications.

22031 - STRENGTH OF MATERIALS DETAILED SYLLABUS

Unit	Name of the Topic	Hours
	DEFORMATION OF METALS	
	Mechanical properties of materials: Engineering materials – Ferrous and non ferrous materials -Definition of mechanical properties such as strength – elasticity, plasticity, ductility, malleability, stiffness, toughness, brittleness, hardness, wear resistance, machinability, castability and weldability Alloying elements-effect of alloying element - Fatigue, fatigue strength, creep – temperature creep – cyclic loading and repeated loading – endurance limit	
I	Simple stresses and strains: Definition – Load, stress and strain – Classification of force systems – tensile, compressive and shear force systems – Behaviour of mild steel in tension up to rupture – Stress – Strain diagram – limit of proportionality – elastic limit – yield stress – breaking stress – Ultimate stress – percentage of elongation and percentage reduction in area – Hooke's law – Definition – Young's modulus - working stress, factor of safety, load factor, shear stress and shear strain - modulus of rigidity. Linear strain – Deformation due to tension and compressive force – Simple problems in tension, compression and shear force. Definition – Lateral strain – Poisson's ratio – volumetricstrain – bulk modulus – volumetric strain of rectangular and circular bars – problems connecting linear, lateral and volumetric deformation – Elastic constants and their relationship - Problems on elastic constants - Definition – Composite bar – Problem in composite bars subjected to tension and compression – Temperature stresses and strains – Simple problems – Definition – strain energy – proof resilience – modulus of resilience – The expression for strain energy stored in a bar due to Axial load – Instantaneous stresses due to gradual, sudden, impact and shock loads – Problems computing instantaneous stress and deformation in gradual, sudden, impact and shock loading and	15
II	GEOMETRICAL PROPERTIES OF SECTIONS AND THIN SHELLS Properties of sections: Definition – center of gravity and centroid - position of centroids of plane geometrical figures such as rectangle, triangle, circle and trapezium-problems to determine the centroid of angle, channel, T and I sections only - Definition-centroidal axis-Axis of symmetry. Moment of Inertia – Statement of parallel axis theorem and perpendicular axis theorem. Moment of Inertia of lamina of rectangle, circle, triangle, I and channel sections-Definition-Polar moment of Inertia-radius of gyration – Problems computing moment of inertia and radius of gyration for angle, T, Channel and I sections. Thin Shells: Definition – Thin and thick cylindrical shell – Failure of thin cylindrical shell subjected to internal pressure – Derivation of Hoop and longitudinal stress causes in a thin cylindrical shell subjected to internal pressure – simple problems – change in dimensions of a thin cylindrical shell	15 Hrs

	subjected to internal pressure – problems – Derivation of tensile stress	
	induced in a thin spherical shell subjected to internal pressure – simple	
	problems – change in diameter and volume of a thin spherical shell due to	
	internal pressure – problems.	
III	LATERAL DEFORMATION	15
	(SF AND BM DIAGRAMS, DEFLECTION OF BEAMS)	Hrs
	Classification of beams – Definition – shear force and Bending moment –	
	sign conventions for shear force and bending moment – types of loadings –	
	Relationship between load, force and bending moment at a section – shear	
	force diagram and bending moment diagram of cantilever and simply	
	supported beam subjected to point load and uniformly distributed load (udl)	
	- Determination of Maximum bending moment in cantilever beam and	
	distributed load	
	Definition – slope, deflection, stiffness and flexural rigidity – Derivations of	
	relationship between slope, Deflection and Radius of curvature – Derivation	
	of slope and deflections of cantilever and simply supported beam by area	
	moment method under point load and udl load-simple problems.	
IV	THEORY OF SIMPLE BENDING AND FRICTION	15
	Theory of simple bending – Assumptions – Neutral axis – bending stress	Hrs
	distribution - moment of resistance - bending equation - M/I=f/y=E/R -	
	Definition – section modulus - rectangular and circular sections – strength of	
	beam – simple problems involving flexural formula for cantilever and simple	
	supported beam.	
	Definition – force of friction – limiting friction- static – dynamic friction – angle	
	of friction – co-efficient of friction – cone of friction – laws of static and	
	dynamic friction – ladder problems	
V	TORSION AND SPRINGS	15
	$T _ f_s _ C\theta$	Hrs
	Theory of torsion – Assumptions – torsion equation $\overline{J} = \overline{R} = \overline{l}$ – strength of	
	solid and hollow shafts - power transmitted - Definition - Polar modulus -	
	Torsional rigidity – strength and stiffness of shafts – comparison of hollow	
	and solid shafts in weight and strength considerations – Advantages of	
	hollow shafts over solid shafts – Problems.	
	Types of springs – Laminated and colled springs and applications – Types of	
	colled springs – Difference between open and closely colled nelical springs	
	determine shear stress deflection stiffness and resilience of closed coiled	
1	determine shear suess, denection, sumess and residence of closed colled	
	helical springs	

Text Books:	1) Strength of Materials ,R. S. Khurmi, , S.Chand & Co., Ram Nagar, New Delhi – 2002
0.	2) Strength of Materials, S. Ramamrutham, 15 th Edn 2004, DhanpatRai Pub.
C0.,	New Delhi.
Reference Books:	1) Strongth of Motoriala, D.K. Donast, J. over: Dublications, D.t. 1 to
Now Dolbi	1) Strength of Materials ,R.K. Bansal,, Laxmi Publications Pvt. Ltd.,
	3 rd Edition, 2010

tion, 2010.

- 2) Strength of materials, S.S.Rattan, Tata Mcgraw hill, New Delhi, 2008, ISBN 9780070668959,
- 3) Strength of Materials, B K Sarkar, I Edition, 2003 Tata Mcgraw hill, New Delhi.
- 4) Engineering mechanics, R.K. Bansal, Laxmi Publications Pvt. Ltd., New Delhi, 2nd Edition, 2007

22031 STRENGTH OF MATERIALS MODEL QUESTION PAPER – I

Time: 3 Hrs

<u>PART – A</u>

<u>Marks 15 x 1 = 15</u>

Answer any 15 Questions – All Questions Carry Equal Marks

- 1. Define Ductility
- 2. State the relationship between E and K
- 3. State Hooke's law
- 4. What is lateral strain
- 5. State the parallel axis theorem
- 6. Define Hoop Stress
- 7. Define Thin cylindrical shell
- 8. Define Moment of inertia
- 9. What is radius of curvature
- 10. Define Slope
- 11. Define Bending moment
- 12. State the relationship between BM and SF
- 13. What is neutral axis
- 14. Write a formula for bending equation
- 15. Define section modulus
- 16. Define centre of curvature
- 17. What is twisting moment
- 18. State the application of laminated spring
- 19. List out the types of springs
- 20. What is polar moment of inertia.

PART – B Marks 5 x 12=60 Answer all the Questions

- 21 a. i) A steel bar 2m long 20mm wide and 10mm thick is subjected (4) to an axial pull of 20KN in the direction of its length. Determine the changes in length and volume. Take $E = 2 \times 10^5$ N/mm² and 1/m = 0.3
 - ii) A brass tube of 50mm outside diameter, 45mm inside (8) diameter and 300mm long is compressed between end washers with load of 24.5KN. Reduction in length is 0.0015mm. Determine the stress, strain and Young's modulus.

(or)

b. A weight of 9.8KN is dropped on to a collar at the lower end of (12 a vertical bar 3m long and 32mm diameter. Calculate the) height of drop, if the maximum instantaneous stress is not to exceed 240N/mm². What is the corresponding instantaneous elongation? Assume $E = 2 \times 10^5 \text{ N/mm}^2$.

Max Marks: 75

- 22. a.i) Find the centroid of a channel section 100 x 50 x 15 mm
 - ii) Determine the change in diameter, change in volume of the spherical shell 2m in diameter and 12mm thick subjected to (4) an internal pressure of 2 N/mm².e E = 2 x 10^5 N/mm² and 1/m = 0.25

(or)

- b. A thin cylindrical shell of 1m internal diameter 5mm thick and (12 2.5m long is filled with a fluid under pressure until its volume) increases by 40 x 10^6 mm³. Determine the pressure exerted by the fluid on the shell. Take E = 2 x 10^5 N/mm² and 1/m = 0.25
- a. A beam is freely supported over a span of 8m. It carries a (12 point load of 3KN at 2m from left hand support and an udl of)
 2KN/m from the centre upto the right hand support. Draw the SFD abd BMD.
 - (or)
 - A cantilever 2m long carries a point load of 20KN at 0.8m from (12 the fixed end and another point load of 5KN at the free end.) In addition, a udl of 15KN/m is spread over the entire length of the cantilever. Draw SFD and BMD
- 24 a.i) State the assumptions made in the theory of Simple bending. (4)
 - A wooden beam of rectangular section 100 x 200 mm is (8) simply supported over a span of 6m. Determine the udl it may carry, if the bending stress is not to exceed 7.5 N/mm². Estimate the concentrated load it may carry at the centre of the beam with the same permissible stress.

(or)

- A beam of T-section flange 150mm x 50mm web thickness (6)
 b.i) 50mm, overall depth 200mm and 10m long is simply supported a central point load of 10KN. Determine the maximum fibre stresses in the beam.
- ii) Derive the flexural formula $\frac{M}{I} = \frac{f_b}{y} = \frac{E}{R}$

 $\frac{M}{I} = \frac{f_b}{v} = \frac{E}{R} \tag{6}$

25. a) A truck weighing 30KN and moving at 5 Km/hr has to be (12 brought to rest by buffer. Find how many springs, each of 18) coils will be required to the energy of motion during a compression of 200mm. The spring is made out of 25mm diameter steel rod coiled to a mean diameter of 240mm. Take $N = 0.84 \times 10^5 \text{ N/mm}^2$.

(or)

b)i) A solid shaft 20mm diameter transmits 10KW at 1200rpm. (6) Calculate the maximum intensity of shear stress induced and angle of twist in degrees in a length of 1m, if modulus of rigidity for the shaft material is 8 x 10⁴ N/mm².

A closed coiled spring made of steel wire 100mm diameter (6) has 10 coils of 120mm mean diameter. Calculate the deflection under an axial load of 100N and stiffness of the spring. Take C = 1.2mPa.

22031 STRENGTH OF MATERIALS MODEL QUESTION PAPER – II

Time: 3 Hrs

Max Marks: 75

$\frac{PART - A}{Marks 15 x 1 = 15}$

Answer any 15 Questions – All Questions Carry Equal Marks

- 1. Define toughness.
- 2. Define poission's Ratio.
- 3. Define proof resilience.
- 4. Write any two elastic constant.
- 5. Define centroid.
- 6. Write down the unit of moment of Inertia.
- 7. Define thin cuclinder.
- 8. Define Moment of inertia
- 9. List out the types of beams.
- 10. Define sheer force.
- 11. Define the term deflection.
- 12. Define radius of curvature.
- 13. Define the term bending stress.
- 14. Define Neutral axis.
- 15. What is limiting friction?
- 16. Define Static friction.
- 17. Define pure torsion.
- 18. Write any two advantages of hollow shafts over solid shafts.
- 19. Give the applications of tension springs.
- 20. Define stiffness of spring.

PART – B

Marks 5 x 12=60

Answer all the Questions

- a. i) Determine the value of Poisson's Ratio and Young's modulus (6) of Rigidity of the material is 0.5 x 10⁵ N/mm² and bulk modulus 0.8x 10⁵ N/mm²
 - ii) Draw stress strain for a mild steel specimen loaded upto (6) failure and explain the salient features.

(or)

- b.i) A copper rod 30mm is surrounded tightly by a cast iron tube of (8) 60mm outside diameter the ends being firmly fastened together. When put to a compressive load of 12kN. What load will be shared by each? Also estimate the amount by which the compound bar shortens in a length of 10mm. Assume ECI = $1.2 \times 10^5 \text{ N/mm}^2$ and Ec = $1 \times 10^5 \text{ N/mm}^2$
- ii) Calculate the Strain Energy that can be stored in a steel bar (4) 40mm in diameter and 3m long subjected to a pull of 100KN. Given E=200KN/mm²

- 22. a.i) State Parallel axis theorem.
 - An I-Section has the top Flange 120mm x 120mm thick, web (8) 180mm x 20mm thick and the bottom flange 200mm x 40mm thick. Calculate the Ixx, Iyy, Kxx and Kyy of the section.

(or)

- b.i) What working pressure may be allowed in a boiler shell 1.8m (3) diameters with plates 15mm thick, if the permissible tensile stress in the solid plate is not to exceed 70 N/mm²
- ii) A Cylindrical Shell 24 m long, 600mm in diameter is made up (9) of 15mm thick plates. Fine the change in length, diameter and volume of the cylinder when the shell is subjected to an internal pressure of 2N/mm². E=2 x 10⁵ N/mm² 1/m=0.3
- a. i) A cantilever of span 5m is loaded with three poin load of 2KN (6) at 2, 4, 5m from the fixed end in addition to a UDL of 1KN/m to a length of 4m from the fixed end. Draw SF and BM diagram.
 - ii) A simply supported beam of 5m span carries a UDL of 2 (6) KN/m over the entire span. In addition the beam carries a point load of 4KN at a distance of 2m from the left support. Draw SFD and BMD.

(or)

- b.i) A Cantilever 2m long, 100mm wide and 200mm deep carries (4) a concentrated load of 5KN at the free end. Find the max slope and deflection. $E=2 \times 10^5 \text{ N/mm}^2$
 - ii) A cantilever beam 6m long is subjected to a UDL of W KN/m (8) speed over the entire span. Assuming Rectangular section with depth equal to twice the width determine the size of the beam so that the max deflection does not exceed 15mm. the max stress should not exceed 100 N/mm² E=2 x 10^5 N/mm²
- 24 a.i) Calculate the max stress in a piece of rectangular steel strip (6) 25mm wide and 3mm thick when it is bend round a drum, 2.5m diameter. $E = 2 \times 10^5 \text{ N/mm}^2$
 - ii) Derive the relationship between the curvature slope and (6) deflection of the beam.

(or)

- b.i) Enumerate the laws of static and dynamic friction. (8)
- ii) Explain the term friction? What is limiting friction?
- 25. a) i) State the assumptions made in the derivation of the tension (4) formula.
 - ii) A solid shaft has to transmit 10 kw at 210rpm. The max. (8) torque transmitted is each revolution exceeds the mean by 30%. If the Shear stress is not to exceed 80 N/mm². Find a suitable diameter of the solid shaft. Calculate the angle of twist for a length of 2 meters. C=0.8 X10⁵ N/mm²

(4)

(4)

- b) i) Distinguish between C closely coiled helical springs and an (4) open coiled helical spring.
 - ii) Design a closely coiled spring of stiffness 20 N/mm deflection. (8) The max. shear stress in the spring metal is not exceed 80 N/mm² under a load of 600 N. The diameter of the coil is to be 10 times the diameter of the wire. Take the modulus of Rigidity as 85 KN/mm².



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22232 - MANUFACTURING TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

31 | P a g e

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22232
Semester	:	III
Subject Title	:	MANUFACTURING TECHNOLOGY

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Subject	Instru	iction	Examination			
	Hours/ Week	Hours/ Semester		Marks		Duration
MANUFACTURING TECHNOLOGY	5	80	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs.

Topics and Allocation of Hours:

UNIT NO.	TOPIC	TIME (Hrs)
I	CASTING PROCESSES	15
II	JOINING PROCESSES	15
	BULK DEFORMATION PROCESSES AND POWDER METTALLURGY	15
IV	CENTRE LATHE AND SPECIAL PURPOSE LATHES	15
V	RECIPROCATING MACHINES	15
	REVISON TEST	5
	TOTAL	80

RATIONALE:

To be a Mechanical Engineer, it is necessary to understand the various technologies that are being used in the process of conversion of raw materials in to finished products. So it is very essential to learn the basics of various technologies and processes that are available and predominantly used in industries.

OBJECTIVES:

- Acquire Knowledge about casting, molding process and types of pattern,
- Explain hot working and cold working processes
- Appreciate the safety practices used in welding
- Explain Powder Metallurgy Process
- Explain Lathe and its working parts
- Describe the functioning of semi automatic lathes and automatic lathes
- Explain the working of machine tools planer, shaper and slotter

22232 - MANUFACTURING TECHNOLOGY

DETAILED SYLLABUS

Cont	ents: Theory	
Unit No.	Name of the Topic	Hours
	CASTING PROCESSES PATTERNS – definition – pattern materials – factors for selecting pattern materials – single piece solid, split patterns – pattern allowances – core prints. MOULDING – definition – moulding boxes, moulding sand – ingredients – silica – clay – moisture and miscellaneous materials – properties of moulding sand – sand additives – moulding sand preparation – mixing – tempering and conditioning – types of moulding – green sand – dry sand – machine moulding – Top and bottom squeezer machines – Jolting machines – sand slinger- core – CO ₂ process core making – types of core – core boxes. CASTING – definition – sand casting using green sand and dry sand – gravity die casting – pressure die casting – hot and cold- chamber processes – centrifugal casting – continuous casting – chilled casting – malleable casting – melting of cast iron – cupola furnace – melting of non ferrous metals – crucible furnace melting of steel and arc furnaces – induction furnaces – instrument for measuring temperature – optical pyrometer – thermo electric pyrometer – cleaning of casting – tumbling, trimming, sand and shot blasting – defects in casting – causes and remedies – safety practices in foundry	15
11	JOINING PROCESSES Arc Welding : Definition – arc welding equipment – arc welding methods – carbon arc, metal arc, Metal Inert gas (MIG), Tungsten inert gas (TIG), Atomic hydrogen, Plasma arc, Submerged arc and Electro slag welding, Gas welding : Definition Gas Welding Equipment– oxy – acetylene welding Three types of flame-resistance welding – definition – classification of resistance welding – butt – spot – seam – projection welding – welding related processes – oxy – acetylene cutting – arc cutting – hard facing bronze welding – soldering and brazing special welding processes – cast iron welding – thermit welding – solid slate welding, ultrasonic, diffusion and explosive welding – explosive cladding – modern welding, electron beam and laser beam welding – types of welded joints – merits and demerits of welded joints – inspection and testing of welded joints – destructive and non destructive types of tests – magnetic particle test – radiographic and ultrasonic test defects in welding – causes and remedies – safety practices in welding .	15

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Text Books

- 1. Hajra Chowdry & Bhattacharaya, Elements of workshop Technology Volume I & II, Edn. XI, Media Promoters & Publishers Pvt. Ltd., Seewai Building `B', 20-G, Noshir Bharucha Marg, Mumbai 400 007 – 2007.
- 2. R. S. Khurmi & J. K. Gupta, A Text book of workshop Technology, Edn. 2, S.Chand & Co., Ram Nagar, New Delhi 2002.

Reference Books:

1. Begeman, Manufacturing process, Edn. 5, McGraw Hill, New Delhi 1981.

2. WAJ Chapman, Workshop Technology, Volume I, II, & III, Vima Books Pvt. Ltd., 4262/3, Ansari Road, Daryaganj, New Delhi 110 002.

3. Raghuwanshi, Workshop Technology, Khanna Publishers. Jain & Gupta, Production Technology, Edn. XII, Khanna Publishers, 2-B, North Market, NAI Sarak, New Delhi 110 006 - 2006

4. P. C. SHARMA, Production Technology, Edn. X, S.Chand & Co. Ltd., Ram Nagar, New Delhi 110 055 - 2006

5. HMT, Production Technology, Edn. 18, published by Tata McGraw Hill publishing Co. Ltd., 7 West Patel Nagar, New Delhi 110 008. – 2001.

6. Kalpakjian, Manufacturing Engineering & Technology
22232-MANUFACTURING TECHNOLOGY

MODEL QUESTION PAPER -1

PART – A

Answer any fifteen questions All question carry equal marks.

1x15=15

- 1. What is casting?
- 2. What is pattern?
- 3. What is core?
- 4. What are the pattern allowances?
- 5. Name the three types of flames used in Gas welding?
- 6. Define Welding?
- 7. Name any two welding defects?
- 8. List the equipments used in arc welding?
- 9. Define Forging?
- 10. What is rolling?
- 11. What is hot working?
- 12. Define powder metallurgy?
- 13. What are the functions of the lead screws?
- 14. What are the functions of back gear mechanism?
- 15. State the application of face plate?
- 16. List out any two lathe tools?
- 17. What are the different types of planer?
- 18. What is planer?
- 19. What is slotter?
- 20. What is the function of a clapper box in a shaper?

PART - B

Answer all the questions

5x12=60

21. a) (i) List out the Pattern allowances and explain(6 marks)

(ii)Explain with neat sketch Co₂ Process of core making.(6 marks)

(OR)

- b) Sketch and explain the working of an electric arc furnace.(12 marks)
- 22. a) Explain MIG and TIG welding processes in detail (12 marks)

(OR)

- b) (i)Describe any two types of non destructive test on welded joints.(6 marks)
 (ii)Describe the process of laser beam welding with the aid of neat sketch. List out its applications.(6 marks)
- 23. a) What are the different methods of manufacturing powders in powder metallurgy process? Explain any two methods(12 marks)

(OR)

- b) (i) Explain with sketch the drop forging process (6 marks)(ii)List out the mechanical properties of parts made by powder metallurgy.(6 marks)
- 24. a) Explain with a neat sketch a single spindle automatic lathe.(12 marks)

(OR)

- b) (i) List out the work holding devices used in a lathe. Explain with a neat sketch any one work holding device.(8 marks)
 (ii)Give differences between capstan and turret lathe.(4 marks)
- 25. a) (i)Explain how the stroke adjustment is made in a shaper.(4 marks)(ii)Describe with neat sketch the principle parts of a slotter(8 marks)

(OR)

b) Explain the construction and working of a double housing planner with a neat sketch.(12 marks)

22232-MANUFACTURING TECHNOLOGY

MODEL QUESTION PAPER -2

PART – A

Answer any fifteen questions All question carry equal marks.

1x15=15

- 1. What is pattern allowance?
- 2. When core is used in a moulding?
- 3. Name the types of cores.
- 4. What is the use of optical pyrometer?
- 5. Name the various arc welding methods.
- 6. What inert gas is used in TIG welding?
- 7. What is soldering?
- 8. What is the use of explosive cladding?
- 9. What is atomization?
- 10. What is smith forging?
- 11. What is the main advantage of hot working over cold working?
- 12. What is drop forging?
- 13. What is the use of tail stock?
- 14. Define cutting speed.
- 15. Name the methods by which taper can be produced in a lathe.
- 16. What is the use of face plate?
- 17. Name the types of planners.
- 18. What is the advantage of quick return motion mechanism?
- 19. How angular surfaces are machined in a shaper?
- 20. What type of work holding device is used for clamping thin plates on a shaper?

PART – B

Answer all the questions

5x12=60

21. A) (i) Explain the various factors affecting selection of pattern materials.(6 marks)(ii) Explain the various ingredients of moulding sand.(6 marks)

(OR)

- B) (i) Sketch and explain in detail the Hot and Cold chamber die casting processes.(12 marks)
- 22. A) (i) Explain the Tungsten Inert Gas welding Process.(6 marks)(ii) Explain the advantages of Submerged arc welding process.(6 marks)

(OR)

B) (i) Sketch and explain the various resistance welding processes.(12 marks)

- 23. A) (i) Explain the Roll forging and upset forging processes .(6 marks)
 - (ii) Explain mechanical properties of parts made of powder metallurgy process.(6 marks)

(OR)

- B) (i) Sketch and explain in the various methods of manufacturing metal powders (12 marks).
- 24. A) (i) Explain the working principle of automatic lathe.(6 marks)
 - (ii) Explain how a lathe is specified.(6 marks)

(OR)

- B) (i) Sketch and explain tumbler gear mechanism in a lathe machine.(12 marks)
- 25. A) (i) Explain the quick return mechanism used in a planner.(6 marks)(ii) Explain the various types of tools used in a slotter.(6 marks)

(OR)

B) (i) Sketch and explain the crank and slotted link mechanism used in shaper.



DIPLOMA IN MECHANICAL ENGINEERING (TOOL&DIE)

L - SCHEME 2011 – 2012

22233 - ENGINEERING METROLOGY

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22233
Semester	:	III
Subject Title	:	ENGINEERING METROLOGY

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			
SUBJECT			Internal Assessmen t (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
Engineering Metrology	5	80	25	75	100	3

Topics and Time allocation

UNIT	ΤΟΡΙϹ	TIME (Hrs)
I	Introduction to Metrology and Linear Measurement	15
II	Angular Measurement, Measurement of Gears and Threads	15
	Measurement of Geometric Parameters and Surface Finish	15
IV	Comparators and Measurement by Light wave Interference & Calibration	15
V	Measuring Machines, Force, Torque, Power & Temperature Measurements & Recent Trends	15
	Revision, Test	5
	Total	80

Rationale:-

The modern industries demand wide knowledge in the understanding and use of conventional and advanced digital measuring instruments that are being used in the process of manufacture of goods. Hence it is essential to have better understanding of the various measuring techniques and the technology that are being used in the various measuring instruments. The fundamentals of various measuring technique needs to be known to understand the modern measuring equipments that are being used in Industries.

OBJECTIVES

The objective of this course is to make the Student:

- > To the Understand the Needs & Objectives of metrology.
- > To Understand about the various linear & angular measuring Instruments
- > To Study about the various Measurement Techniques.
- > To Calibrate an Instrument.
- > To Know about various geometric parameters.
- > To use Light rays in Measuring an Object.
- > To Measure Force, Torque and temperature
- > To know about the measuring machines.
- > To acquire Knowledge about Recent Trends in Metrology.

22233 - ENGINEERING METROLOGY

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
No.		
1	Introduction to Metrology and Linear Measurement: 1.1 Introduction: Metrology, objectives of metrology, precision vs accuracy. Repeatability, calibration, sensitivity and readability, classification of methods of measurement, general care of equipments. 1.2 Non precision Linear Measurements: Surface plates, Tool maker's flats and high precision surface plates, Angle plates, bench centers, v-blocks, straight edges, Toolmaker's straight edges, using a straight edge, sprit levels, combination set, universal surface gauge, Engineer's square, Engineer's parallel, Radius gauge, feeler gauge, screw pitch gauge, Engineer's taper, wire and thickness gauge. 1.3 Precision Linear Measurements: - Characteristics and principles of precision measuring instruments. Vernier instruments, types of vernier calipers, errors in calipers, Vernier height gauge, Vernier depth gauge, digital readout height gauge. Micrometers – Internal micrometers, micrometer depth gauge, thread micrometer, v-anvil micrometer, dial micrometers, digital micrometers, groove micrometer. Telescope internal gauge, Measuring dia of deep holes, cylinder gauges, Keilpart gauge, slip gauges.	15
11	 Angular Measurement, Measurement of Gears and Threads: 2.1 Angular Measurement: - Instruments for angular measurement – Vernier and optical bevel protractor, universal bevel protractor, acute angle attachment, optical dividing head, Sine bars, Sine center, angle gauges, clinometers. 2.2 Optical instruments for angular measurement: - Autocollimator – principle of the autocollimator, micro optic autocollimator, applications of autocollimator. Angle dekkor – working principle, use of angle dekkor in combination with angle gauges. Optical square. 2.3 Measurement of Gears: Gear tooth terminology, Gear tooth calliper, Composite method of Gear checking, Parkinson's Gear tester, Master Gear. 2.4 Thread Measurements: Screw thread projection, Tool Maker's Microscope, Measurement of Effective Diameter. One wire, Two wire and Three wire Methods.	15
111	 Measurement of Geometric Parameters And Surface Finish 3.1 Straightness, Flatness, Parallelism and squareness: - Definition of straightness, straight edge and its use, test for straightness by using spirit level and Autocollimator, Flatness definition, flatness testing, procedure for determining flatness, laser equipment for alignment testing. Parallelism definition, various cases of parallelism of lines and planes, measurement of equidistance, checking of coincidence or alignment. Squareness definition, squareness testing methods – indicator method, Engineer's square tester, optical tests for squareness. 	15

	 .2 Circularity and Rotation: - Circularity definition, measurement of circularity, Different types of irregularities of a circular part – ovality, lobbing, irregularities of non specific form. Roundness and circularity. Devices for measuring circularity error – V block, precision measuring instruments. Tests for checking Rotation – Run out, measurement of run out, Periodical axial slip, camming. 3.3 Surface Finish : - Surface roughness – definition, terminologies as per BIS, Methods of measuring Surface finish – Surface inspection by comparison methods, Direct measurement methods. Analysis of surface traces. 	
IV	 Comparators And Measurement By Light Wave Interference, 4.1 Comparators : Characteristics and uses of comparators, Working principle, advantages and disadvantages of various types of comparators– Mechanical comparators, optical comparators, Electrical comparators, pneumatic comparators, Fluid displacement comparators, optical Projectors. 4.2 Measurement by light wave interference: Interferometry, interference of two rays, light source for interferometry, interferometry applied to flatness testing, Interferometers. 4.3 Testing and Calibration of Gauges: - Calibration of linear and angular measuring instruments – General metrological instrument, optical measuring instruments, Measurement of limit gauges. 	15
V	 Measuring Machines, Force, Torque, Power and Temperature Measurement and Recent Trends In Metrology: 5.1 Measuring Machines : Optical profile projector – working principle, use, precaution in use. Coordinate Measuring Machine – Types, uses, advantages, possible source of error in CMM. Electronic Inspection and measuring machines. 5.2 Force, Torque, Power & Temperature Measurement: 5.2.1 Force Measurement: Introduction, Force balance, hydraulic load cell, pneumatic load cell, Elastic force devices, Separation of Forces – calibration. 5.2.2 Torque & Power Measurement: Definition, Transmission, Dynamometer, Driving type Dynamometer, Absorption Dynamometer. 5.2.3 Temperature Measurement: Introduction, Non Electrical methods, Electrical methods, Radiation methods. 5.3 Trends in Metrology: Laser Telemetric system, Feeler microscope, Isometric viewing of surface defects. optoelectronic dimensional gauging, computers in metrology, Computer Aided dimensional analysis and reporting system, In process probing, contact less 3D measurements by Laser based system. 	15

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Text Books:

- 1. R.K.Jain., Engineering Metrology, Khanna Publishers, Eleventh edition, 1989.
- 2. R.Jenkins, Fundamentals of Mechanical Inspection, McGraw Hill Book company.

Reference books :

- 1. ASTME, Hand book of Industrial Metrology, Prentice Hall
- 2. A.J.T Scarr, Metrology and Precision Engineering, McGraw Hill Book company.
- 3. J.Johnson, Precision Measurement, Pitman publishers
- 4. R.L.Murty, Precision Engineering in Manufacturing, New Age International Publishers (P) limited, 1995.
- 5. A.W.Judge, Engineering Precision Measurements, Chapman and Hall Publishers.
- 6. A.P.Miller, Engineering Dimensional Metrology, Arnold publishers.
- 7. W.Mollard, Essentials of Precision Inspection, McGraw Hill Book company.F.H.Rolt, Gauges and Fine Measurements, Macmillan book company.
- 8. P.C.Nakra & K.K.Chowdhry, Instruments, Measurements & Analysis

22233-ENGINEERING METROLOGY

MODEL QUESTION PAPER-1

Total Marks : 75

<u>PART -A</u>

1.Answer Any Fifteen Questions

TIME: 3 Hrs

15X1 =15

All Questions carry Equal Marks

- 1. Define Metrology
- 2. Define accuracy
- 3. What are the uses of straight edges?
- 4. What are the types of micrometers?
- 5. Mention any five angular measuring instruments.
- 6. What is the use of acute angle attachment?
- 7. Mention any five types of optical instrument for angular measurement.
- 8. Define module of the gear.
- 9. Define straightness.
- 10. Define Parallelism.
- 11. What is meant by run out?
- 12. Define waviness.
- 13. Mention the types of comparator.
- 14. What is interferometry?
- 15. What are the light sources used for interferometry?
- 16. Define Calibration.
- 17. What is CMM?
- 18. What are the uses of optical profile projector?
- 19. What are the instrument used for measuring force?
- 20. What are the uses of CMM?

PART –B

Answer all Questions

5X12=60

- 21. a) (i) Differentiate precision and accuracy. (6 marks)
 - (II) Explain combination set with neat sketch.(6 marks)(OR)
 - a. Sketch and explain Vernier depth gauge.(12 marks)

22. a) Explain measurement of angle by using Sine Bar with neat sketches.(12 marks)

(OR)

- b) (i) Explain Angle Dekkor with sketches.(4 marks)(ii) Explain Gear tooth Vernier Caliper with neat sketches.(8 marks)
- a) (i) Explain Engineer square tester with a neat sketch.(6 marks)
 (ii) Explain the procedure for checking periodical axial slip and camming.(6 marks)
 (OR)
 - b) Explain direct measurement methods for determining surface finish.(12 marks)
- 24. a) Explain fluid displacement comparator with neat sketches.(12 marks)

(OR)

- b) (i) Explain Testing of flatness by interferometry.(8 marks)(ii)Write the calibration procedure for linear measuring instruments.(4 marks)
- 25. a) Sketch and explain Optical Profile projector.(12 marks)

(OR)

b) (i) Explain the working principle of absorption type dynamometer.(8 marks)(ii)Write short notes on computers in metrology (4 marks).

22233 – ENGINEERING METROLOGY MODEL QUESTION PAPERII

Time : 3 Hrs

Max. Marks : 75

PART – A

1x15=15

Answer any fifteen questions

All question carry equal marks.

- 1. Write the least count of vernier caliper
- 2. Define precision
- 3. List out the uses of internal micrometer
- 4. Write down the advantages of combination set.
- 5. Write down the formula for determine the angle by using sine bar
- 6. What is the principle used in autocollimator
- 7. What is the use of optical square?
- 8. Write down the applications for universal bevel protector
- 9. Define surface roughness
- 10. What is the use of straight edge??
- 11. Define coincidence
- 12. List out the different types of irregularities of a circular part?
- 13. Write down the working principle of mechanical comparator
- 14. What are the uses of fluid displacement comparator?
- 15. Write down the importance of calibration
- 16. How can flatness tested by using interferometry?
- 17. What is Feeler microscope?
- 18. Define force balance
- 19. Write down the working principle of optical profile projector
- 20. List out the types available for measuring temperature

PART – B

Ans a)	ver all Sub Questions5xi) Explain about repeatability and readability(4)	x12=60 ⊧)
	(ii) Briefly explain with the use of neat sketch: micrometer (8 (OR)	3)
	(b) (i) Classify the methods of measurements and give two examples for each (4	l)
	(ii) sketch and explain: screw pitch gauge (8)	3)

22 (a) List out the methods of angular measurement and briefly explain any two methods(12)

(OR)

(b) List out the methods of measuring threads and briefly explain any two wire methods (12)

- 23 (a) Define straightness, write down its types. Briefly explain about any one type(12) (OR)
 - (b) (i) Define circularity and explain the tests for checking rotation (6)
 - (ii) Define parallelism and explain various casus of parallelism of lines and planes(6)
- 24 (a) what are uses of comparator and explain any one type with neat sketch (12) (OR)
 (b) (i) Briefly explain about optical measuring instruments (8) (ii) write down the calibration procedure for angular measuring instruments (4)
 25 (a) Sketch and explain CMM and its merits, application (12) (OR)
 - (b) Briefly explain about contactless 3D measurement by laser based system (12)



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22034 – MACHINE DRAWING

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22034
Semester	:	III
Subject Title	:	MACHINE DRAWING

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
Machine Drawing	6	96	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No	Topics	Hours
I	Sectional Views	3
II	Limits, Fits and Tolerances	6
	Surface Texture	3
IV	Keys, Screw threads and Threaded fasteners	6
V	Drawing practice of sleeve & Cotter joint, Spigot and cotter joint, Knuckle joint, Stuffing Box, Screw Jack, Foot step bearing, Universal Coupling, Plummer Block, Swivel Bearing, Simple Eccentric, Machine Vice, Protected type flanged coupling, Connecting Rod, Tail Stock – Manual Drawing Practice	75
	Revision and Test	3
	Total	96

RATIONALE:

Manufacturing of various machine parts and production of various equipments in small scale to big scale industries start from the basic drawing of components. The assembly of components is also carried out from the drawing. So drawing is an important subject to be studied by supervisor cadre students to carry and complete the production and assembly process successfully.

The first three are theory units in which the students can comprehend the various types of sections used in drawing practice. Types of fits used, limits and tolerances of dimensions and surface finish methods which are to be used in industrial drawing will also be taught in these three units.

The fourth unit is also a theory unit in which the students can understand the types of fasteners and study of temporary fasteners like keys, screw threads and threaded fasteners which are commonly used in assembly process.

The final unit gives the practice of manual drawing of the commonly used components in industries to give a thorough knowledge of drawings.

The overall objective is to impart knowledge to the students so as to carry out the production and the assembly process without wastage of Man/Machine and Materials to have economical overall process.

OBJECTIVES:

- Appreciate the need for sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Appreciate the importance of fits and tolerance.

22034 - MACHINE DRAWING DETAILED SYLLABUS

Contents: Th	eory	
Unit	Name of the Topic	Hours
I	SECTIONAL VIEWS Review of sectioning – Conventions showing the section – symbolic representation of cutting plane- types of section – full section, half section, offset section, revolved section, broken section, removed section – section lining.	3 Hrs
II	LIMITS, FITS AND TOLERANCES	6 Hrs
	Tolerances – Allowances – Unilateral and Bilateral tolerances. Limits – Methods of tolerances – Indication of tolerances on linear dimension of drawings – Geometrical tolerances – application – Fits – Classifications of fits – Selection of fits – examples	
111	SURFACE TEXTURE	3 Hrs
	Surface texture – importance – controlled and uncontrolled surfaces – Roughness – Waviness – lay – Machining symbols	
	KEYS, SCREW THREADS AND THREADED FASTENERS Types of fasteners – temporary fasteners – keys – classification of keys – Heavy duty keys – light duty keys. Screw thread – Nomenclature – different types of thread profiles – threads in sections – threaded fasteners – bolts – nuts – through bolt – tap bolt, stud bolt – set screw – cap screws – machine screws – foundation bolts	
V	MANUAL DRAWING PRACTICE Detailed drawings of following machine parts are given to students to assemble and draw the sectional or plain elevations / plans / and side views with dimensioning and bill of materials 1. Sleeve & Cotter joint 2. Spigot & Cotter joint 3. Knuckle joint 4. Stuffing Box 5. Screw Jack 6. Foot step bearing 7. Universal Coupling 8. Plummer Block 9. Swivel Bearing 10. Simple Eccentric 11. Machine Vice 12. Protected type flanged coupling 13. Connecting Rod 14. Tail Stock	75 Hrs

Reference Books:

1) Machine Drawing, P.S. Gill, Katsan Publishing House, Ludiana

2) A Text book of Engineering Drawing, R.B. Gupta, Satya Prakasan, Technical India Publications, NewDelhi

3) Mechanical Draughtsmanship, G.L. Tamta, Dhanpat Rai & Sons, Delhi

4) Geometrical and Machine Drawing, N.D. Bhatt, Cheroter book stalls, Anand, West Railway

5) Engineering Drawing, D.N. Ghose, Dhanpat Rai & Sons, Delhi

22034 MACHINE DRAWING MODEL QUESTION PAPER-1

Max Marks : 75

Time: 3 Hrs Part A & Part B to be answered in Drawing sheet

<u>PART A</u> <u>4 x 5= 20</u>

Theory questions:

Answer any four questions

- 1. Name different types of section. Explain with example full section and half section.
- 2. Define Hole basis and shaft basis system. Explain with sketch.
- 3. Name different types of fits. Draw the tolerance zone for defining those fits.
- 4. Indicate roughness grade symbol for N10.
- 5. Illustrate the types of keys. Draw a gib headed key with its proportions.

PART B : 55 Marks

1. Assemble and Draw the following views of stuffing box (Detailed drawing given)

Right half sectional elevation	:	30
Plan	:	20
Bill of Material	:	5

22034 MACHINE DRAWING MODEL QUESTION PAPER – II

Max Marks : 75

Time: 3 Hrs

$\frac{PART - A}{Marks 4 \times 5 = 20}$

Answer any 5

- 1. What is the need for sectioning? Explain broken section and revolved section with neat sketch.
- 2. why hole basis system is preferred over shaft basis system? Explain with suitable eg & sketch.
- 3. Define i) Lay
 - ii) Waviness with suitable sketch. Draw conventional symbol for mentioning surface finish.
- 4. State the conventions followed in representing threads in drawings. Draw the representation for internal and external threads.
- 5. Draw 3 views of square nut of diameter 60 mm with proper formulae.

PART – B

II Assemble and draw the below mentioned views of SCREW JACK

Right Half sectioned elevation Plan	30 20
Viva Voce	05
Total	75



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22235_ENGINEERING METROLOGY PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name (TOOL & DIE)	:	DIPLOMA IN MECHANICAL ENGINEERING
Course Code	:	1220
Subject Code	:	22235
Semester	:	III
Subject Title	:	ENGINEERING METROLOGY PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instr	uctions		Examinati	on	
				Marks		
SUBJECT	Hours/ Week	Hours/ Semester	Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
Engineering Metrology Practical	4	64	25	75	100	3

OBJECTIVES

- > To practice linear and angular measurements
- > To Use vernier caliper, vernier height gauge and micrometer
- > To Use slip gauges to make standard dimensions
- > To Measure angle of surface using sine bar
- > To Use dial indicator to measure geometrical parameters
- > To Demonstrate parallelism, square ness and circularity
- > To Check the perpendicularity and square ness of a surface
- > To Calibrate vernier caliper and micrometer using slip gauges

Detailed Syllabus

I. LINEAR MEASUREMENT:

1(a). Vernier caliper – Measuring the overall dimensions of a Die plate to an accuracy of 0.02 mm.

- 1(b). Micrometer Measuring diameter and thickness of die components to an accuracy of one micron (0.001mm)
- 2(i). Vernier height gauge:- a) Measurement of height of the given work pieceb) Marking the given dimensions on the work piece.c) Transferring measurements from one job to another.
- 2(ii). Vernier Depth gauge Measuring the depth of blind holes in the give work piece.
- 3(a). Screw thread micrometer Measuring the root dia of the given screw thread
- 3(b). Measurement of pitch of screw threads using screw pitch gauges.
- 3(c). Measurement of effective dia of screw thread using three wire method
- 4. Measurement of Internal dia of the given die set bush using Inside Micrometer to an accuracy of one micron.
- Slip Gauges Building up the given required dimensions and measuring or marking or setting Go and No Go sizes in adjustable gap gauges, to an accuracy of 0.5 micron.
- 6. Measuring the chordal thickness of the gear teeth using the gear tooth vernier.

II ANGULAR MEASUREMENT:

- 7. Measurement of angles using universal bevel protractor to an accuracy of 5'.
- 8. Using combination set i) Measure angle in the given component with protractor head
 - ii) Find or mark the center of the given cylindrical job using center head.
 - iii) Check and report the square ness of the given specimen using square head.
- 9. Measure the angle of the surface using Sine bar and Slip Gauges.

III. MEASUREMENT OF GEOMETRIC PARAMETERS AND CALIBRATION OF INSTRUMENTS:

- 10. Straightness Measurement of concavity / convexity in a surface using Toolmaker's straight edge and feeler gauge.
- 11. Checking the parallelism of two planes using dial indicator.
- 12. Testing circularity of die set pillars using v-block and dial indicators.
- Measurement of Run-out on i) External cylindrical surface ii) external conical surface using dial gauge iii) Checking of Perpendicularity of drill head guide iv) Checking of squareness of clamping surface of table to its axis.
- 14. Measurement of axial slip using dial indicators.
- 15. Calibration and adjusting of micrometers/ Vernier caliper using slip gauges.

SCHEME OF EXAMINATION:

	Durat	ion	Max. Marks
I) <u>Part – A</u>			
a) Linear Measurement			
Or	1 ½ Hrs.		35
b) Angular Measurement			
II) <u>Part – B</u>			
c) Measurement of Geometrical			
Parameters & calibration.	1 ½ F	Irs.	35
III)	Viva	– Voce	05
		Total	75
SCHEME OF VALUATION:			
Observation / Reading	-	10 marks	
Tabulation / Formula	-	10 marks	
Calculation & Result	-	15 marks	

DETAILS OF THE EQUIPMENTS

NAME OF THE BRANCH / COURSE	MECHANICAL ENGINEERING
	(TOOL & DIE)
YEAR	SECOND
SEMESTER	III
	22235 ENGINEERING METROLOGY
NAME OF THE LABORATORY	PRACTICAL

S.NO	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1	Vernier caliper 0-150mm	6
2	Micrometer 0-25mm	6
3	Vernier height gauge 0-300mm	2
4	Vernier depth gauge 150mm	2
5	Screw thread micrometer	1
6	Inside micrometer 50-200mm	6
7	Slip gauges	2
8	Gear tooth vernier	2
9	Universal bevel protractor	3
10	Combination set	1
11	Sine bar 200mm	1
12	Tool makers straight edge	2
13	Feeler gauge	2
14	Dial test indicator with magnetic stand	3
15	V-block	1
16	Surface plate	1
17	Spirit level	2
18	Go & No gauges set	1



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22236-MANUFACTURING TECHNOLOGY PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22236
Semester	:	III
Subject Title	:	MANUFACTURING TECHNOLOGY PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instr	uctions		Examinati	on	
				Marks		
SUBJECT	Hours/	Hours/	Internal	Board	Total	Duration
	Week	Semester	Assessment	Examination	(Marks)	(Hrs)
			(Marks)	(Marks)	(marks)	
Manufacturing						
Technology Practical	5	80	25	75	100	3

OBJECTIVES:

- Identify the parts of a center lathe
- Identify the work holding devices
- Set the tools for various operations
- Operate the lathe and Machine a component using lathe
- Identify the tools used in foundry.
- Identify the tools and equipments used in welding
- Prepare sand moulds for different patterns.
- Perform welding operation to make different types of joints.
- Identify the different welding defects.
- Appreciate the safety practices used in welding

1. Lathe

Syllabus

- 1. Introduction of safety in operation machines.
- 2. Introduction to lathe and its parts.
- 3. Introduction to work holding devices and tool holding devices.
- 4. Types of tools used in lathe work
- 5. Types of measuring instruments and their uses.
- 6. Setting of work and tools.
- 7. Operation of lathe
- 8. Practice on a lathe

Exercises :

- 1. Plain turning
- 2. Step turning
- 3. Taper turning
- 4. Thread cutting and knurling
- 5. Bushing

Lathe Works

Time:4Hrs/ Week

Manufacture and estimate the cost of the following exercises by assuming the suitable raw material for the final size of the components.

<u>Note to the faculty</u> :- Last job of the raw material(MS Rod Ø32x77mm and MS Rod Ø25x77mm) to be retained in student wise or batch wise (Maximum Two Students per batch). This may be verifiable at the time of Board Practical Examination by the external examiner

Exercise No:1 -Plain turning .

Raw Material: MS Rod Ø32x77mm



Exercise No:2-Step turning Raw Material: Exercise No:1



Exercise No:3-Step and taper turning

Raw Material: Exercise No:2



Exercise No: 4-Step and taper turning

Raw Material: Exercise No: 3



Exercise No: 5 Knurling and step turning

Raw Material: Exercise No:4



Exercise No:6 BSW Thread cutting

Raw Material: Exercise No:5



Exercise No:7 – Metric thread cutting

Raw Material: Exercise No:6



Exercise No:8- Metric thread cutting

Raw Material: Exercise No:7



Exercise No: 9-Shaft and bush mating Raw Material: MS Rod Ø25x77mm and Ø32x30mm



Exercise No: 10- Thread cutting

Raw Material: Exercise No:9



Exercise No:11- Thread cutting Raw Material: Exercise No:10



Exercise No:12-Eccentric Turning

Raw Material: Exercise No:11



2. Foundry

Syllabus

- 1. Introduction of tools and equipments
- 2. Types of patterns
- 3. Types of sand
- 4. Preparation of sand moulds
- 5. Furnaces crucible furnace and tilting furnace
- 6. Melting if non ferrous metal
- 7. Core sands, preparation of cores

Exercises :

Preparation of sand mould :

- 1. Solid pattern
 - a. Stepped pulley
 - b. Bearing top
 - c. Gear Wheel
 - d. T-pipe
- 2. Split pattern
 - a. Bent Pipe
 - b. Tumbles
- 3. Loose Piece Pattern Dove tail
- 4. Cylindrical core making
- 5. Melting and casting (not for Examination, only for class exercises)

3. Welding

Syllabus

- 1. Introduction of Safety in welding shop
- 2. Introduction to hand tools and equipments
- 3. Arc and gas welding equipments
- 4. Types of joint

Exercises :

- 1. Arc welding
 - Lap joint (Material : 25 mm x 3mm Ms flat)
 - Butt joint (Material : 25mm x 6mm Ms flat)
 - T- joint (Material : 25mm x 3mm Ms flat)
 - Corner joint (Material : 25mm x 3mm Ms flat)
- 2. Gas Welding
 - Lap joint (Material : 25mm x 3mm Ms flat)
 - Butt joint (Material : 25mm x 6mm Ms flat)
- 3. Gas cutting : Profile cutting
- 4. Spot welding Lap joint (18/20swg)
- 5. Demonstration of Soldering and brazing

Scheme of Examination

Lathe	:	45 marks (2hours)
Foundry (or) Welding	:	25 marks (1 hour)
Viva-voce	:	05 marks
Total	:	75 marks

LIST OF EQUIPMENT

Turning:		
1. Center Lathe 4 1/2 ' Bed length	_	15 No's
2. 4 Jaw / 3 Jaw Chucks	_	required Numbers
3. Chuck key (10 mm x 10 mm size)	_	15 No's
4. Box spanner	_	15 No's
5. Cutting Tool H.S.S ¼ "X ¼ "X 4 " long	_	15 No's
6. Pitch gauge	_	5 Nos
7. Vernier Caliper (0-25 and 25-50)	_	5 nos each
8. Micrometer, Inside and Outside (0-25 and 25	5-50) -	5 each
9. Vernier Height Gauge(300mm)	- ′	1 no
10. Snap gauge	_	1 set
11. Gear tooth Vernier	-	1 No
12. Parallel Block	-	2 Nos
13. Steel Rule (0-150)	_	15 Nos.
14. Outside and Inside Calipers	-	15 Nos. each
15. Thread gauge	_	5 Nos.
16. Bevel Protractor	_	1 No
17. Jenny Caliper	_	5 Nos.
18. Dial Gauge with Magnetic Stand	_	5 Nos.
19. Marking Gauge	_	10 Nos.
20. Safety Glass	_	15 Nos.
Welding:		
1 Arc welding booth	_	2 No's with all /air appled
	_	Z NO S WILLI OIL/ALL COOLED
	_	welding transformer with
		welding transformer with accessories
2. Gas welding unit (Oxvgen and acetvlene cvl	inder) -	welding transformer with accessories - 1 Set
 Gas welding unit (Oxygen and acetylene cyl Flux 	inder) -	welding transformer with accessories - 1 Set 500 grams
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 	inder) - 	 welding transformer with accessories 1 Set 500 grams 200 No's
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 	- inder) - - -	 welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 	- inder) - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18" 	- inder) - - - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 	- inder) - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 9. Spot welding machine 	- - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 9. Spot welding machine 	- - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 9. Spot welding machine Foundry:	- inder) - - - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18" 8. Flux chipping hammer 9. Spot welding machine Foundry: Crucible furnace 	- inder) - - - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18" 8. Flux chipping hammer 9. Spot welding machine Foundry: 1. Crucible furnace Tilting furnace 	- inder) - - - - - - - - -	 2 No's with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 9. Spot welding machine Foundry: 1. Crucible furnace Tilting furnace 3. Shovel 	- inder) - - - - - - - - - - - -	 2 No s with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18'' 8. Flux chipping hammer 9. Spot welding machine Foundry: 1. Crucible furnace 2. Tilting furnace 3. Shovel 4. Rammer set 	- inder) - - - - - - - - - - - -	 2 No s with on 7air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos 30 Nos
 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18" 8. Flux chipping hammer 9. Spot welding machine Foundry: 1. Crucible furnace 2. Tilting furnace 3. Shovel 4. Rammer set 5. Slick 	- - - - - - - - - - - - - -	 2 No s with on 7air cooled welding transformer with accessories - 1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos 30 Nos 30 Nos
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 Gas welding unit (Oxygen and acetylene cyl Flux Electrode 10 SWG Face shield Gas welding goggles Leather Glows 18" Flux chipping hammer Spot welding machine Foundry: Crucible furnace Tilting furnace Shovel Rammer set Slick Strike-off bar Riddle Trowl 	- inder) - - - - - - - - - - - - - - - - - - -	 2 No s with on 7air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos 30 Nos
 Cas welding unit (Oxygen and acetylene cyl Flux Electrode 10 SWG Face shield Gas welding goggles Leather Glows 18'' Flux chipping hammer Spot welding machine Foundry: Crucible furnace Tilting furnace Shovel Rammer set Slick Strike-off bar Riddle Trowl Lifter 	- inder) - - - - - - - - - - - - - - - - - - -	 2 No s with on 7air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos 30 Nos
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 2. Gas welding unit (Oxygen and acetylene cyl 3. Flux 4. Electrode 10 SWG 5. Face shield 6. Gas welding goggles 7. Leather Glows 18" 8. Flux chipping hammer 9. Spot welding machine Foundry: 1. Crucible furnace 2. Tilting furnace 3. Shovel 4. Rammer set 5. Slick 6. Strike-off bar 7. Riddle 8. Trowl 9. Lifter 10. Sprue pin 11. Brush 	- inder) - - - - - - - - - - - - - - - - - - -	 2 No s with on /air cooled welding transformer with accessories -1 Set 500 grams 200 No's 3 No's 2 No's 4 Set 4 No's 1 No 1 No 1 No 20 Nos 30 Nos
- 12. Vent rod
- 13. Draw spike
- 14. Gate cutter
- 15. Cope box
- 16. Drag box 17. Core box
- 18. Runner & riser
- 19. Moulding board
- 20. Patterns

- 30 Nos -
- 10 Nos -
- 60 Nos -
- 30 Nos --
 - 15 Nos each



COMMON TO ALL BRANCHES

L - SCHEME 2011 - 2012

20001-COMPUTER APPLICATIONS PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Subject Title	:	COMPUTER APPLICATIONS PRACTICAL
Semester	:	III Semester
Subject Code	:	20001
Course Code	:	1220
Course Name	:	COMMON TO ALL BRANCHES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
Subject Title	Hours /Week	Hours /Semester	Marks			
COMPUTER APPLICATIONS 4 Hrs 64 Hrs		Internal Assessme nt	Board Examination	Total	Duration	
FRACTICAL			25	75	100	3 Hrs

RATIONALE:

The application of Computer knowledge is essential to the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents, analyzing the data with charts manipulation of databases and presentation of documents with audio visual effects in a computer.

The learning of internet provides students with unprecedented opportunities to obtain information engage in discussion and liaise with individuals, organizations and groups world-wide. It provides the latest tools and technologies in helping the students to fetch better employment.

OBJECTIVES:

On completion of the following exercises, the students must be able to

- Understand the Windows operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Analyze the data sheet
- Create and manipulate the database
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the eighteen experiments given in the list of experiments should be completed and all the experiments should included for the end semester practical examination.
- The end semester practical examination question paper contains two questions-the first question from section-I and the second question from section-II. Each question carries 35 marks and viva voce carries 5 marks.
- The computer systems should be 1:2 ratio for practical classes

ALLOCATION OF MARKS

1. Internal Assessment – 25 Marks

DESCRIPTION	MARKS ALLOTTED
Record with Printout	10
Assignment	5
Attendance	5
Model Examination	5
Total	25 MARKS

2. Board Examinations - 75 Marks

Content	Max. Marks		
	Section I	Section II	
Writing steps	15	15	
Execution of exercise	15	15	
Result with Printout	5	5	
Viva voce	5		
Total	75 Marks		

LAB EXERCISES

SECTION - I

WINDOWS

Introduction- History of Windows- screen saver and monitor resolution - Wallpaper setting-

Folder manipulation - properties of a folder - Recycle bin - Short cuts - Sorting Folder -

Switching between Application – Copying in CD/DVD settings – Recording Audio files.

Exercises

- 1. a. Installing screen saver and change the monitor resolution by 1280X960
 - b. Setting wall papers
 - c. Creating, moving, deleting and renaming a folder
 - d. Copy, paste and cut a folder/file
 - e. Displaying the properties for a file or folder
- 2. a. Restoring files and folders from Recycle bin
 - b. Creating short cuts for folder/file
 - c. Finding a file or folder by name
 - d. Selecting and moving two or more files/folders using mouse
 - e. Sorting folders/files.
- 3. a. Copying files into CD/DVD
 - b. Switching between applications
 - c. Making the taskbar wider and hiding the taskbar
 - d. Recording and saving an audio file
 - e. Set/Change the date and time.

WORD PROCESSING

Introduction – Menus – Tool bar – Create – Edit – Save – Alignment – Font Size – Formatting – Tables – Fill Colors – Mail Merge – Page Setup - Preview – Water marking – Header – Footer – Clip art.

Exercises

4. Create the following table and perform the operations given below

ABC PVT. LTD.

Chennai

Production Summary of various Units in every Quarter

Product - ID	Jan-Mar	Apr-june	July-Sept.	Oct-Dec.
56	234.	50	74	125
142	236	126	175	251
213	541	216	60	43
125	243	127	250	136
143	152	138	80	45
	Product - ID 56 142 213 125 143	Product - ID Jan-Mar 56 234. 142 236 213 541 125 243 143 152	Product - IDJan-MarApr-june56234.50142236126213541216125243127143152138	Product - IDJan-MarApr-juneJuly-Sept.56234.50741422361261752135412166012524312725014315213880

- Arrange Unit name as left align and other columns as right align.
- Use doubled Border to the Summary Title and fill with 15% gray colour.
- Implement merging and splitting two or more cells
- Give alternative fore colour for columns.
- Print the above table.
- 5. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.
- 6. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction – Menus – Tool bar – Create – Edit – Save – Formatting cells – Chart wizard – Fill Colors – Creating and using formulas – Sorting – Filtering.

Exercises

7. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

Result is Distinction if Total >= 70 % First Class if Total > = 60 % and < 70 % Second Class if Total >= 50 % and < 60 % Pass if Total >= 35 % and < 50 % Fail otherwise

Create a separate table based on class by using auto filter feature.

- 8. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue colour and lowest donation with red colour. The table should have a heading.
- 9. Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.

SECTION - II

DATABASE

Introduction - Menus - Tool bar - Create - Edit - Save - Data types - Insert - Delete -

Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

10. Create Database to maintain at least 10 addresses of your class mates with the following

constraints

- Roll no. should be the primary key.
- Name should be not null
- 11. Prepare a payroll for employee database of an organization with the following details:

Employee Id, Employee name, Date of Birth, Department and

Designation, Date of appointment, Basic pay, Dearness Allowance,

House Rent Allowance and other deductions if any.

Perform simple queries for different categories.

11. Design a pay slip for a particular employee from the above database.

PRESENTATION

Introduction - Menus - Tool bar - Create - Edit - Save - Slide transition - Insert image -

Hyper link – Slide numbers – View slide show with sound – Photo album – Clip art.

Exercises

- 13. Make a marketing presentation of any consumer product with at least 10 slides. Use different customized animation effects on pictures and clip art on any four of the ten slides.
- 14. Create a Presentation on "Communication Skills" with three different slide transitions with sound effect.
- 15. Create a photo album in PowerPoint.

INTERNET

Introduction – Browsers – Open a website – Email: Send, receive and delete – Email with Attachments Google docs – Search Engines – Searching topics

Exercises

16. Create an e-mail id and perform the following

- Write an e-mail inviting your friends to your Birthday Party.
- Make your own signature and add it to the e-mail message.
- Add a word attachment of the venue route
- Send the e-mail to at least 5 of your friends.
- 17. Create a presentation on Google docs. Ask your friend to review it and comment on it. Use "Discussion" option for your discussions on the presentation.
- 18. Find out the direction and distance about road travel from Delhi to Agra using the Internet search. Also make a report of the Map and other details like place to stay and visit at Agra.

MODEL QUESTION PAPER

Year Code	/ Sem: II / III Subject: COMPUTER APPLICATIONS PRACTICAL e: 20001
Answ Max.	ver all the questions Marks:75
1	<u>Section - I</u>
	Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.
2	Section - II
	 Create an e-mail id and perform the following Write an e-mail inviting your friends to your Birthday Party. Make your own signature and add it to the e-mail message. Add a word attachment of the venue route Send the e-mail to at least 5 of your friends.

LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED FOR A BATCH OF 30 STUDENTS

SOFTWARE REQUIREMENTS

Operating System	Windows XP or Windows Vista or Windows 7 / Linux
Office Package	Microsoft office 2000 or Office 2003 or Office 2007/Open Office

HARDWARE REQUIREMENTS

Desktop Computer System with latest configuration	30 Nos
Power Backup (UPS)	10 KVA
Laser Printer	3 Nos

SAFETY PRECAUTIONS TO BE FOLLOWED BY STUDENTS

- Do not touch, connect or disconnect any plug or cable without teacher's permission
- Don't attempt to touch any live wires
- Systems should be shutdown properly after completion of work

REFERENCES

TITLE	AUTHOR	PUBLISHER	Year of Publication
Computer Applications	Dr.V.Karthikeyan	Learning Resource	
Practical Manual	Mr.D.Arulselvan	Centre, Thiagarajar	2012
		Polytechnic College,	2012
		Salem- 636 005	
Windows 7 in easy steps	Harshad kotecha	Tata McGrawHill	2011
A First Course in Computer 2003	Sanjay Sasena	Vikas Publications	2009
MS Office – 2003	Ramesh Bangia	Kanna Book Publication	2005
Introduction to Computers with MS-Office 2000	Alexis Leon & Mathews Leon	Tata McGraw-Hill	2002
Mastering Microsoft Office 2000	Gini Courter & Annette Marquis	BPB Publications	1999





DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22241 - ENGINEERING MATERIALS AND METALLURGY

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22241
Semester	:	IV
Subject Title	:	ENGINEERING MATERIALS AND METALLURGY

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Subject	Inst	E	Examination	า	
ENGINEERING	Hours/Week	Hours/Semester	Assessment Marks		arks
MATERIALS AND METALLURGY	5	80	Internal	Board Exam	Total
			25	75	100

TOPICS AND TIME ALLOCATION

UNIT	TOPIC	TIME (Hrs)
I	Metallurgy and Material Structure	15
II	Phase diagrams and Iron Carbon equilibrium diagram	15
Ш	Heat Treatment and Properties of Engineering Materials	15
IV	Ferrous and Non – Ferrous Metals and their Alloys	15
V	Metallography, Surface Treatment and Non Destructive Testing	15
	Revision, Test	5
	Total	80

Rationale:- The knowledge about the various types of Engineering Materials, their properties and applications are required for proper selection and use of materials in Tool Design and design of mechanical engineering components. Thorough understanding of the methods of heat treatment, their effect and applicability is essential to ensure the full service life of the tools and components. The knowledge on various metallographic and non destructive testing methods is necessary to verify the properties, condition and nature of various materials.

OBJECTIVES

The objective of this course is to make the Student:

- > To know about the different types of material structure.
- > To Acquire knowledge on Deformation of Metals.
- > To Understand the Phase Diagrams.
- > To Understand and Use Iron Carbon Equilibrium Diagram.
- > To Study about various Heat Treatment Process.
- > To Get Knowledge on Thermal & Magnetic properties of Materials.
- > To know about Superconductivity.
- > To study about various Ferrous & Non Ferrous Alloys.
- > To understand the process of Non Destructive Testing.

22241 - ENGINEERING MATERIALS AND METALLURGY

DETAILED SYLLABUS

Contents: Theory

Unit		Hours
No.	Name of the Topics	
	METALLURGY AND MATERIAL STRUCTURE:	
I	1.1 Crystalline Structure Crystallography, crystal, single crystal, crystallization of metals, crystal symmetry, elements of symmetry, space lattice, unit cell, lattice parameters of unit cell, primitive cell, crystal structure, crystal system – cubic system, Tetragonal system, Hexagonal or trigonal system, orthorhombic system, monoclinic system, triclinic system. Miller Indices, Crystal directions, coordinate number, atomic radius, number of atoms per unit cell, density of crystal material. Material structure –Face centered cubic (FCC), Body centered cubic (BCC), Hexagonal close-packed (HCP).	15
	1.2 Bonding in solids Primary bonds – Metallic bond, Ionic bond, Covalent bond. Imperfections in metal crystals- types of defect- point defect, line defect, surface defect, volume defect, effect of imperfection on metal properties	
	1.3 Deformation of metals: Elastic deformation, plastic deformation, elastomeric deformation, anelastic deformation, thermo elastic effect, elastic after effect. Deformation by slip, ideal plastic body. Plastic deformation of a single crystal – slip, twinning. cold working and effect of cold working on metals. Hot working of metals, advantages and disadvantages of hot working	
	PHASE DIAGRAMS AND IRON CARBON EQUILIBRIUM DIAGRAM:	
	2.1 Phase Diagrams:	
II	Solid solution – types of solid solution- substitutional and interstitial solid solution- solid solution alloy – System, Phase, and Component, Degree of freedom or variance of the system. Phase rule, Cooling curves – cooling curve of pure metal, solidification or crystallization of metal, cooling curve of eutectic type alloy. Construction of equilibrium diagrams, Interpretation of equilibrium diagrams. Types of phase diagrams – Eutectic system, Peritectic system, Eutectoid system, Peritectoid system. Iron-Carbon system – allotropy of iron, micro constituents of iron and steel, Iron-iron carbide equilibrium diagram, critical temperatures, effect of alloying elements on Fe-Fe ₃ C diagram.	15
	2.2 Heat Treatment and Transformation Diagram :	
	Purpose of Heat Treatment, Heat treatment cycle, Time-Temperature- Transformation (TTT) diagram – importance of T.T.T diagram, steps to construct T.T.T diagram, T.T.T diagram for eutectoid steel, T.T.T diagram and cooling curves	

	HEAT TREATMENT, PROPERTIES OF ENGINEERING MATERIALS:	
	3.1 Properties of Engineering Materials: Introduction, Thermal Properties – Introduction, Heat capacity, Expansion, conductivity, Thermal stress. Magnetic Properties – Introduction, Diamagnetism, Para Magnetism, and Ferromagnetism, Influence of Temperature on Magnetic Behavior. Superconductivity. Chemical Properties – Introduction, Corrosion & Degradation, Forms of Corrosion, Corrosion environment, Corrosion Prevention, Oxidation.	
	3.2 Heat Treatment of Steel:	
III	Annealing – stress relief annealing, Process annealing, spheroidise annealing, Full annealing. Normalising, Hardening – process, quenching medium, hardenability, end quench hardenability test. Tempering – low temperature tempering, medium temperature tempering, High temperature tempering, Temper brittleness, Austempering, Martempering. Case hardening – carburising – pack carburising, liquid carburising, gas carburising. Nitriding, cyaniding, carbonitriding. Surface hardening – flame hardening, induction hardening.	15
	FERROUS AND NON – FERROUS METALS AND THEIR ALLOYS:	
IV	4.1 Ferrous Metals & its Alloys: Pig Iron – classification, properties and applications, Wrought Iron – composition, properties and uses. Cast Iron – Introduction, classification, effects of alloying elements on the structure of cast iron. Designation system of Cast Iron as per BIS. Composition, Mechanical properties, applications of Grey cast iron , Spheroidal graphite cast iron ,Malleable cast iron .Steels – Classification of steel , Effects of alloying elements in steel. Composition, Mechanical properties ,	15
	Applications of low carbon steel, medium carbon steel and high carbon steel. HSS, Tool steel, Stainless steel - Composition, Mechanical properties and applications	15
	 4.2 Non – Ferrous Metals & its Alloys: Aluminium & its alloys – types, properties and applications. Designation system of aluminium and its alloys as per BIS .Copper & its Alloys – Types , Brass, Gun metal – Composition , properties & applications, Zinc – Composition, properties & applications . 4.3 Non- Metallic Materials : Ceramics – Nature of ceramic materials – types, applications 	

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	Metallography, Surface Treatment and Non Destructive Testing	
	5.1 Metallography : Metallurgical microscope – Preparation of specimen, micro and macro examination. Study of micro structure of Ferrous and Non Ferrous metals. Modern techniques of material studies – electron microscope, photoelectron spectroscopy.	
v	5.2 Surface Treatment: Mechanical cleaning and finishing – Vibratory finishing, wire brush cleaning, buffing and electro polishing. Chemical cleaning – Vapour degreasing, solvent cleaning, alkaline cleaning, ultrasonic cleaning, acid pickling. Surface coatings – Electroplating, painting, powder coating, blackening, vacuum Metallizing, Physical vapour deposition, chemical vapour deposition.	15
	5.3 Non Destructive Testing: Magnetic particle inspection, X-Ray inspection, Gamma radiography, Ultrasonic Inspection, Electrical methods, Damping test, Non magnetic methods of crack detection.	

Text Books:

1. Dr . O.P.Khanna , Material science and Metallurgy, Dhanpat Rai & Sons

2. Material Science and Engineering ,William .D.Callister JR , Sixth Edition References Books

1. ASM Hand book, Vol.1, ASM International, Materials Park, Ohio, U.S.A, 1990.

2. Alok Nayar, The Metals Data Book, Tata McGraw-Hill Publishing Company Limited, first edition, 1997.

3. S.K.Hajra Choudhury and A.K.Hajra Choudhury, Elements of Workshop Technology, Media Promoters and publishers pvt. Ltd, 1982.

4. Metals Handbook, vol.3, 9th edition, American Society for Metals, Metals Park, Ohio, U.S.A., 1980.

5. R.B.Guptha, Material Science and Processes, Satya Prakashan Inc., Tech India Publications, 4th edition, 1983.

6. S.N.Bagchi and Kuldip Prakash, Industrial Steel Reference book, New Age International Limited, Publications, 2nd edition, 1995.

7. Mechanical Metallurgy - Dieter.

8. Physical Metallurgy – Lakhtin.

9. Elements of Physical Metallurgy – Sydney Anver.

10.Engineering Metallurgy ,Part –I , Raymond A.Higgins , Sixth Edition .

22241 - ENGINEERING MATERIALS AND METALLURGY

MODEL QUESTION PAPER

PART -A

TIME : 3 Hrs

Total Marks : 75

1.Answer Any Fifteen Questions

All Questions carry Equal Marks

- 1. What is an unit cell?
- 2. What are the types of primary bonds?
- 3. Define: Atomic radius.
- 4. What is Work Hardening?
- 5. What are the types of solid Solution?
- 6. Write the Gibb's Phase rule.
- 7. Write the importance of T.T.T diagram.
- 8. Name the micro constituents of Iron and steel.
- 9. Define : Malleability.
- 10. Define : Thermal Conductivity.
- 11. Give examples for quenching Medium.
- 12. Define: Hardenability.
- 13. Write the mechanical properties of Grey cast iron.
- 14. Write the applications of Tool Steel.
- 15. Write the applications of Zinc.
- 16. What are the types of Ceramics?
- 17. Differentiate between micro and macro examination .
- 18. Write the steps to prepare the specimen.
- 19. What is Electroplating?
- 20. What is the use of Magnetic particle inspection?

15X1 =15

PART –B

Answer all questions

5X12=60

21. a) (i) Define Miller Indices and explain Miller Indices with an example (4 marks) (ii) Explain any two types of Primary Bonds.(8 marks) (OR) a. Explain in detail Deformation by Slip and twinning.(12 marks) 22. a) (i)Explain the construction of Equilibrium diagram.(4 marks) (ii)Explain briefly the Eutectic reaction and Peritectic reaction (8 marks) (OR) b) Describe the T.T.T diagram for Eutectoid steel.(12 marks) 23. a) (i) Write about the influence of Temperature on Magnetic behavior(6 marks) (ii)What is Hardenability and explain in detail, the testing of hardenability using end quench test.(6 marks) (OR) b) Explain with neat sketch : the various surface hardening techniques.(12 marks) 24. a) Write the Composition, properties and applications of Grey Cast Iron. (OR)b) Write the Composition, properties and applications of Low, Medium and High carbon steel. 25. a) Write the construction and working of Electron microscope.(12 marks) (OR) b) (i) Explain with neat sketch : a) Vapour degreasing b) Vacuum matalising.(8 marks)

(ii)Explain : Ultrasonic Inspection.(4 marks)

22241 - ENGINEERING MATERIALS AND METALLURGY MODEL QUESTION PAPERII

Time : 3 Hrs

PART – A

Answer any fifteen questions

All question carry equal marks.

- 1. What are the elements of crystal symmetry?
- 2. What are the lattice parameters of a unit cell?
- 3. Name the types of defects in metal crystals.
- 4. Write the advantages of hot working of metals.
- 5. Define: Phase.
- 6. Give an example for eutectic system.
- 7. Define: Allotropy of Iron.
- 8. What happens during the critical temperatures?
- 9. Define :Thermal stress.
- 10. What is the difference between hardening and hardenability? .
- 11. Write the limitations of Nitriding process.
- 12. What is precipitation treatment ?
- 13. Write the classifications of pig iron.
- 14. What is the effect of adding chromium in cast iron?
- 15. 20 C8 What does it mean?
- 16. Write the applications of ceramic materials.
- 17. Define : Metallography.
- 18. Write about buffing operation.
- 19. Name the solvents that are used in solvent cleaning.
- 20. What is ultrasonic inspection?

PART – B

Answer all Questions

21. (a) Explain atomic radius, co-ordination number, number of atoms, Atomic packing factor for any one of the material structure. (12)

(or)

(b) (i) Explain: Recovery, Recrystalisation and grain growth.(ii) List out the types of deformation of meals and explain any one	(6) (6)
22. (a) (i) Describe in detail the solidification of metal.(ii) How will you construct the TTT diagram	(6) (6)
(or)	
(i) Describe in detail the interpretation of phase diagram. (ii) Explain about importance of TTT diagram	(6) (6)

(ii) Explain about importance of TTT diagram

1x15=15

: 75

Max. Marks

5x12=60

23. (a) (i) Name the types of Annealing process and explain any two.	(6)
(ii) Briefly explain about Influence of Temperature on Magnetic Behavio (or)	or(6)
(b) (i) Explain in detail the heat treatment process of Aluminium.(ii) What is Tempering? Explain any one methods	(6) (6)
24. (a) Write the Composition, properties and applications of steel (or)	(12)
(b)Write the mechanical properties, composition and applications of Zinc.	(12)
25. (a) Explain in detail (i)Solvent cleaning (ii) Electroplating processes (or)	(12)
(b)Explain with neat sketch the microstructure of any one each from ferrous and nor	n ferrous

metal.

(12)



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22242 - FLUID POWER AND THERMAL ENGINEERING

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22242
Semester	:	IV
Subject Title	:	FLUID POWER AND THERMAL ENGINEERING

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
		urs/ Hours/ eek Semester	Marks			
SUBJECT	Hours/ Week		Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
FLUID POWER AND THERMAL ENGINEERING	5	80	25	75	100	3

Topics and Time allocation

UNIT	TOPIC	TIME (Hrs)
	PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS	15
II	PNEUMATIC SYSTEM	15
	HYDRAULIC SYSTEM	15
IV	THERMODYNAMICS	15
V	INTERNAL COMBUSTION ENGINES AND HEAT EXCHANGERS	15
	Revision, Test	5
	Total	80

RATIONALE:

The growth of Engineering and Technology is associated with fluid power applications and heat & work transfer. Low cost Automation using Pneumatics and Hydraulic machines and presses are very common in Automobile and Die casting industries. Hence studying the fundamentals of Pneumatics, Hydraulics and Heat transfer facilitates better understanding of their applications in the area of Tool & Die Making and widens the employment opportunities.

OBJECTIVES

At the end of the study of this subject the student will be able to:

- Define the properties of fluids
- > Explain the working of pressure measuring devices
- > Appreciate the use of fluid power
- > Explain the working of pneumatic system and its elements
- > Explain the working of Hydraulic system and its elements
- > Compare pneumatic system with hydraulic system
- > Design fluid power circuits for industrial applications
- > Explain the concept and application of thermodynamics
- > Compare various thermodynamic processes
- > Explain the working of heat exchanger and its effectiveness

22242 - FLUID POWER AND THERMAL ENGINEERING

DETAILED SYLLABUS

Contents: Theory

UNIT NO	NAME OF THE TOPIC	HOURS
1	PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS Fluid-Definition-Classification of fluids-Ideal and real fluids-Newtonian and non- Newtonian-Properties of fluids-Density, Specific weight, Specific volume, Specific gravity, Compressibility, Viscosity, Surface tension and capillarity. Pressure-Unit of pressure-Pressure head-Atmospheric pressure-Gauge pressure and Absolute pressure-Problems-Pascal's law-Proof-Applications of Pascal's law- Hydraulic press, Hydraulic jack. Pressure Measurement -Piezometer tube-Simple U-tube manometer- differential U- tube manometer-Inverted differential U-tube manometer-Micro manometer- Inclined tube micro manometer-Problems-Mechanical Pressure gauge-Bourdan tube pressure gauge-Diaphragm pressure gauge-Dead weight pressure gauge.	15
II	PNEUMATIC SYSTEM Pneumatic system and its elements-Filter, Pressure regulator, Lubricator unit- Pressure control value-3/2 DCV, 5/2DCV, and 5/3DCV-Check value- Flow control value-Throttle value-Shuttle valve-Quick exhaust valve-Time delay value- Pneumatic actuators-Single acting cylinder, Double acting cylinder, Air motor, ISO symbols of Pneumatic components. Pneumatic Circuits-Direct operation of single acting cylinder-Operation of double acting cylinders-Operation of double acting cylinder with metering-in control- Operation of double acting cylinder with metering-out control-Use of shuttle valve in pneumatic circuit-Use of quick exhaust valve in pneumatic circuits-Automatic operation of double acting cylinder-Merits and Demerits of pneumatic system- Applications.	15
111	HYDRAULIC SYSTEM Hydraulic system and its elements-Merits, Demerits and applications of hydraulic system. Hydraulic pumps-types-positive displacement pumps and non positive displacement pumps -Gear pumps-External gear and internal gear type-vane pump-Axial piston pump and Radial piston pump-Hydraulic cylinders and Hydraulic motors - ISO symbols for hydraulic components -pressure relief valve- Directional control valves-3/2DCV,4/2DCV,4/3DCV. Hydraulic accumulator and its uses-Types-Gravity type accumulator, spring loaded accumulator, Gas loaded accumulator-Pressure intensifier. Hydraulic circuits-Operation of double acting cylinder using metering-in control and metering out control-Operation of Hydraulic motor using metering-in and metering out- control Hydraulic circuit using sequence valves and counter balance valves - Hydraulic circuit for shaping machine, surface grinding machine and Milling machine. Comparison of Hydraulic and Pneumatic systems.	15

IV	THERMODYNAMICS Thermodynamics system-Types-Closed system, Open system and isolated system-Property and state of a system-Intensive and Extensive properties - Thermodynamic process-Cycle-Point and Path functions-Law of conservation of energy-Thermodynamic equilibrium-Zeroth law, First law and Second law of thermodynamics. Law of perfect gases-Boyle's law, Charle's law, Joule's law, Regnault's law-Equation of state-Universal gas constant-Relationship between the specific heats and gas constants. Expansion of gases-Thermodynamic process-Constant volume-Constant pressure, Isothermal, Reversible adiabatic, Polytropic -free expansion and throttling processes- P-V diagram- work done, change in internal energy, heat transfer, change in enthalpy and Change in entropy for various processes-Problems.	15
V	INTERNAL COMBUSTION ENGINES AND HEAT EXCHANGERS Introduction to IC Engines-Classification-Working of four stroke cycle petrol and diesel engines-Merits & Demerits-Working of two stroke cycle petrol and diesel engines-Merits & Demerits-Comparison of four stroke and two stroke engines. Heat transfer in engineering –Modes of heat transfer-Conduction, Convection and Radiation. Heat transfer by conduction-Fourier law of heat transfer-Thermal conductivity of engineering materials-Heat conduction through plane wall-Heat conduction through composite wall-Simple problems. Newton's law of cooling-Stefan Boltzmann law of radiation. Heat exchanger-types, parallel flow heat exchanger, counter flow heat exchangers-Application of heat exchangers. Temperature distribution for a parallel flow heat exchanger-Log Mean Temperature Difference (LMTD) - the heat transfer through counter flow heat exchanger-Simple problems in heat exchangers.	15
	REVISION AND TEST	05

Text Books:

- 1. Sundaramurthy, Fluid Mechanics and Fluid Power, Narayana publications
- 2. Nag.P.K., Engineering Thermodynamics, Tata Mc Graw Hill
- 3. R.C.Sachdeva, Fundamentals of Engineering Heat and Mass Transfer, Fourth edition, New age international publishers.
- **4.** R.Srinivasan, Hydraulic and Pneumatic controls, Vijay Nicole Imprints PVT.LTD, second edition, Chennai.

Reference Books:

- 1. Khurmi.R.S, A Test book of Hydraulics, Fluid Mechanics and Hydraulic Machines, S Chand & CO
- 2. Khurmi R.S and Kupta.K, A Text book of Thermal Engineering, S Chand & CO
- 3. Ballaney.B.L., Applied Thermodynamics , Kanna publishers
- 4. Bansal.R.K, Fluid Mechanics and Hydraulic Machines
- 5. Elango.S & Soundarajan.V, Introduction to Hydraulics and Pneumatics, PHI learning Pvt Ltd, 2011 second Edition

22242 - FLUID POWER AND THERMAL ENGINEERING

MODEL QUESTION PAPER-1

Answer Any Fifteen Questions

15X1 =15

All Questions carry Equal Marks

- 1. State the classification of fluids.
- 2. Define gravity of a fluid?
- 3. Define gauge pressure
- 4. State the purpose of differential U-tube manner.
- 5. Draw the symbol of filter
- 6. What is the use of shuttle valve?
- 7. Draw the symbol of 3/2 DCV push button operated.
- 8. State the use of quick exhaust valve?
- 9. What is a positive displacement pump?
- 10. Draw the symbol of variable displacement bidirectional pump
- 11. Mention the use of accumulator
- 12. Draw the symbol of pressure relief valve
- 13. What is intensive property of a system
- 14. State boyle's law
- 15. What is the work done in a constant pressure process
- 16. State the value of heat transfer in an adiabatic process
- 17. What is the use of spark plug in a petrol engine
- 18. State the value of compression ratio in a diesel engine
- 19. State newton's law of cooling
- 20. What is a heat exchanger?

PART-B

Answer all the questions -5x12 = 60 marks.

- 21. A (i))One litre of oil weighs 9.6N. calculate its specific weight, density and specific gravity
 - (ii) Write short notes on pressure measurement by piezometer

B. Compare gauge pressure with absolute pressure and explain the working of diaphragm type pressure gauge with a neat sketch

- 22. A (i) Explain the working of shuttle valve with neat diagram.
 - (ii) Explain the working of lubricator with neat diagram.

(OR)

- B. Draw pneumatic circuit for the meter-in control of a double acting cylinder and explain.
- 23. A (i) What is an accumulator? State its functions
 - (ii) Explain the working of gravity type accumulator with neat sketch

(OR)

B. Draw a hydraulic circuit for the operation of a shaping machine and explain its working

24.A. (i) Explain open loop system and closed loop system with examples

(ii)Stae the first law of thermodynamics and second law of thermodynamics

(OR)

B. A mass of 2.25kg of N₂ occupying 1.5m3 is heated from $25^{\Box}C$ to $200^{\Box}C$ at constant volume. Calculate the initial and final pressure of the gas and also calculate the heat transfer and work done molecular weight of nitrogen is 28 and universal gas constant is 8314 J/kgmol.K. Assume C_p =1.02 KJ/kg.k.

25.A. Explain the working of two stroke cycle petrol engine with a neat sketch and state its

merits

(OR)

B.(i) derive an expression for heat transfer through composite wall made up of two layers . (ii) A wall of 0.5m thick is constructed from a material of thermal conductivity k1=1.4 (W/m.k). The wall is to be insulated with a material of k2=0.35(W/m.k) so that the heat loss per square Meter will not exceed 1450 watt. Assume the inner and outer walls temperatures are at 1200° C and 15° C respectively. Calculate the thickness of insulation required.

22242 FLUID POWER AND THERMAL ENGINEERING

MODEL QUESTION PAPER ---II

Part--A

- 1. Define Newtonian fluid
- 2. Define viscosity of a fluid
- 3. State the application of Pascal's law
- 4. State the use of invented U-tube manometer
- 5. What are the elements of a pneumatic system?
- 6. Draw the symbol of 5/2 DCV lever operated
- 7. What is the purpose of quick exhaust value in a pneumatic circuit?
- 8. State any two industrial applications of pneumatic system
- 9. Classify the different types of pumps
- 10. State any two merits of hydraulic system
- 11. Draw the symbol of gas loaded accumulator
- 12. State the use of pressure intensifier
- 13. Define property of a system and give example
- 14. Define zeroth law of thermodynamics
- 15. State Joule's law
- 16. Write the relationship between C_p, C_v and R
- 17. State the classification of I.C. Engines based on cooling system
- 18. What is meant by scavenging?
- 19. What is the value of compression ratio in a petrol engine?
- 20. State law of radiation

Part—B

21.(A) State pascal's law and write the proof of pascal's law

(OR)

(B) A simple U-tube manometer is used to measure the pressure of water in a pipe line. The mercury level in the open tube is 70mm higher than that on the left tube. The height of water in the left tube is 50mm. Calculate the pressure in the pipe in a) meter of water b) in kN $/m^2$ 22.(A) Explain pneumatic system with a block diagram and state the advantages of pneumatic system.

(B) Draw a pneumatic circuit for the automatic operation of a double acting cylinder and explain its working.

23.(A) Explain the service properties of hydraulic oil and state the merits of hydraulic system

(OR)

(B) Draw a hydraulic circuit for the sequential operation of two double acting cylinders and explain the working of sequential circuit

24 A. Explain constant pressure process and derive an expression for work done, change in internal energy and heat transferred during this process.

B. Air $0.35m^3$ at $22\square C$ and at a pressure 101.325 kN/m_2 is heated under constant volume to a temperature of $100\square$ c, determine (i) mass of air (ii) final pressure (iii) heat transfer and (iv) change in entropy. Assume $C_p=1 \text{ kJ/kgK}$, $C_V=0.71\text{kJ/kg}$.K

25.A Explain the working of four stroke diesel engine with a neat sketch

(OR)

B. Explain the working of counter flow heat exchanger with a neat diagram and derive an expression for the heat transfer through counter flow heat exchanger.



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22243-TOOL ROOM SPECIAL MACHINES

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22243
Semester	:	IV
Subject Title	:	TOOL ROOM SPECIAL MACHINES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours	Hours /Somester	Marks			Duration
	/WCCK	/Semester				
TOOL			Internal	Board	Total	
ROOM	5	80	Assessment	Examination		
SPECIAL			25	75	100	3 Hrs
MACHINES						

Topics and Allocation of Hours:

SI.No	Торіс	TIME (Hrs)
I	Cutting Tools and Mechanics of Cutting Tools	15
II	Drilling, Boring and Jig boring Machines	15
III	Milling Machines and Gear Generating Process	15
IV	Grinding, Jig Grinding and Tool & Cutter Grinding Machines	15
V	Non-Conventional Machines	15
	Revision and test	5
	TOTAL	80

RATIONALE:

Globalization made tremendous growth in industrial activities, which in turn needs Tool and Die Makers. If the requirement has not been met industrial growth cannot be sustained. Hence knowledge in exploration of various sources of special machines covering various operations for Tool & Die Makers and skill in the area of Tool & Dies as required for the development of nation and its people.

OBJECTIVES:

At the end of the study of this subject the student will be able to:

- Describe the different forces in orthogonal cutting
- Estimate the forces in metal cutting operations
- Compare the properties of different cutting fluids
- Explain the working of drilling machine
- Explain the boring operation and their applications.
- Explain the construction and operation of Jig boring machine
- Explain the working of milling machine.
- Distinguish various types of milling cutter.
- Classify the different types of grinders and grinding wheels.
- Describe Jig grinding machine
- Explain the operation of Universal tool & cutter grinder
- Appreciate the use of non conventional machining processes.
- Distinguish between EDM and Wire cut EDM machine operation

22243 - TOOL ROOM SPECIAL MACHINES

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
1	CUTTING TOOLS & MECHANICS OF METAL CUTTING Cutting tools- properties of cutting tool materials – cutting tool materials: High carbon steels, High speed steel, Carbides, Ceramics. Types of cutting tools - Types of metal cutting – orthogonal and oblique cutting – chip formation – continuous, discontinuous, buildup edge – shear angle.Tool signature- Importance Cutting forces in orthogonal cutting – metal removal rate Tool life- Taylor's life equation - factors influence in tool life. Tool dynamometer – types of tool dynamometer Machinablility – machinablility index - factors affecting machinablility. Cutting fluids– properties of cutting fluids – selection of cutting fluids.	15
I	 DRILLING MACHINES & BORING AND JIG BORING 2.1 DRILLING MACHINES Drills-flat drills-twist drills-nomenclature-types of drilling machines-bench type-floor type-radial type-gang drill-multi spindle type-principle of operation in drilling-speeds and feeds for various materials-drilling holes-methods of holding drill bit-drill chucks-socket and sleeve-drilling-reaming-counter sinking-counter boring-spot facing-tapping-deep hole drill-drill jigs. 2.2 BORING AND JIG BORING: Boring machines-horizontal and vertical types -fine boring machines-boring tools Jig boring machine-measuring system-hole location procedure-deep hole boring 	15
III	 MILLING MACHINES AND GEAR GENERATING PROCESSES 3.1 MILLING MACHINES: Types-column and knee type-plain-universal milling machine-vertical milling machine-specification of milling machines-principles of operation-work and tool holding devices-arbor-stub arbor-spring collet-adapter-milling cutters-cylindrical milling cutter-slitting cutter-side milling cutter-angle milling cutter-T-slot milling cutter-woodruff milling cutter-fly cutter-nomenclature of cylindrical milling cutter-milling process-conventional milling-climb milling-milling operations-straddle milling-gang milling-vertical milling attachment. 3.2 GENERATING PROCESS: gear shaper-gear hobbling-principle of operation only-gear finishing processes-burnishing-shaving-grinding and lapping-gear materials-cast iron, steel, alloy steels, brass, bronze, aluminum, nylon. 	15
IV	GRINDING, JIG GRINDING AND TOOL & CUTTER GRINDING MACHINES 4.1 GRINDING MACHINES: Types and classification-specifications-rough grinders-floor mounted hand grinders- portable grinders-belt grinders-precision grinders-cylindrical, surface, centre-less grinders-internal grinders-planetary grinders-principles of operations-grinding wheels- abrasives-natural and artificial-dressing and truing of wheels-balancing of grinding wheels-diamond wheels-types of bonds-grit, grade and structure of wheels-wheels shapes and sizes-standard marking systems of grinding wheels-selection of grinding wheel-mounting of grinding wheels. Lapping and Honing Process	15

	4.2 JIG GRINDING	
	Introduction – construction – operation techniques – setting up and clamping – wheel travel – wheel selection – wheel dressing 4.3 UNIVERSAL TOOL & CUTTER GRINDER Introduction – selection of cutter – grinding wheels – shape, abrasive grain size and bond direction of rotation – teath root, turge, parts of the universal teal and cutter	
	arinder, clearance, width of land – producing the clearance angle	
v	 NON-CONVENTIONAL MACHINES 5.1 NON-CONVENTIONAL MACHINES: Construction and working of Ultrasonic machining-chemical machining-electro chemical grinding- plasma arc machining-LASER machining-Advantages – Disadvantages-Applications-of the above processes. SPARK EROSION Introduction – principle of spark erosion and requirements – mechanism – dielectric fluid – essential requirements of dielectric fluid – layout of spark machining system, EDM machine – tool materials – electrical circuits in EDM – Metal removal rate – mean current – operation parameters and typical values and tool wear – reasons – classification and types. EDM process characteristic – advantages and disadvantages of EDM process – wire cut EDM, CNC Wire cut EDM for machining punch and die cavities. 5.2 TOOL ROOM SPECIAL MACHINE MAINTENANCE Requirements – types of maintenance – effect of improper maintenance – maintenance schedules – maintenance cost 	15

TEXT BOOKS

- Hajra choudhry, "Work shop Technology", Vol. II, Media Promoters and Publishers Pvt. Ltd.
 Chapman.WAJ., "Work shop Technology", Vol. II & III, ELBS

REFERENCE BOOKS :

- 1. Paul De Garmo.E., & Others, "Materials and Processes in Manufacturing", Macmillan Publishing Company
- 2. Jain & Gupta, Production Technology, Khanna Publishers, 2-B, North Market, Naisarak, new Delhi
- 3. MOORE AND VICTORY, "Holes, Contour And Surfaces"
- 4. HMT, "Production Technology"
- 5. BATTACHARYA, "Workshop Technology"
22243 - TOOL ROOM SPECIAL MACHINES MODEL QUESTION PAPER-1

Note: Answer any 15 Questions

Max.Marks: 75

Marks-1 X 15= 15

PART A

- 1. State the different types of chip formations.
- 2. State the Taylor's equation
- 3. Write the different types of dynamometer
- 4. Define machinability index
- 5. What is point angle of a twist drill?
- 6. What is boring operation?
- 7. List the various types of drilling machines
- 8. What is the use of sleeve?
- 9. Name any two types of indexing methods in milling.
- 10. Write the formula for simple indexing.
- 11. Name any two gear finishing processes.
- 12. Name any two important materials used for making gears
- 13. List the abrasives used for making grinding wheels
- 14. What is truing of grinding wheel?
- 15. Write the parts of the cylindrical grinding machine
- 16. State the different grinding methods
- 17. What are the methods of circulation of dielectric fluid in EDM?
- 18. What are the limitations of EDM ?
- 19. What are the dielectric fluids used in EDM spark machine
- 20. Write any two non conventional machines

PART-B

<u>Answer all the questions $-5 \times 12 = 60$ marks</u>

- 21 A. Explain various cutting tool materials. (OR)
 - B. Explain the orthogonal and oblique cutting.
- 22 A Draw and explain a radical drilling machine. (OR)
 - B Draw and Explain the Jig boring machine

23 A What are the cutters used for milling a) keyway b) T-slot, c) Dovetail grooves (OR) B Draw and explain the various types of gear finishing processes.

- 24A Explain the Universal Tool & cutter Grinder with neat diagram. (OR)
 - B Explain the constructional details and working principle of Jig Grinding machine
- 25A Explain the constructional features of EDM Spark Erosion machine with neat sketch. Mention the advantages. (OR)
 - B Draw and explain a laser machining process and state its advantages.

22243 TOOL ROOM SPECIAL MACHINES MODEL QUESTION PAPER-II

Note: Answer any 15 Questions

Max.Marks: 75

PART A

Marks-1 X 10= 10

- 1. Define tool life.
- 2. State any two factors influencing the tool life
- 3. State any two properties of cutting fluids.
- 4. What is chip formation?
- 5. What are the methods used to locate hole in Jig boring machine.
- 6. List out various types of drilling machines
- 7. What is reaming?
- 8. Write any tool holding devices used in drilling machines
- 9. Write any two types of milling machines
- 10. Write any two types of milling operations
- 11. Write any two names of milling cutters
- 12. Write any two attachments used in milling machines
- 13. What is lapping?
- 1. List out various types of surface grinding machines
- 2. Write the parts of the universal tool and cutter grinder
- 3. Mention any two advantages of Universal tool milling machine
- 17. Write any two limitation of EDM wire cut machines
- 18. Write any two limitation of plasma arc machining
- 19. What are the types of maintenance
- 20. What is Metal removal rate in EDM

PART B

Marks-5X12=60

- 21 A Draw and explain the Merchant circle of forces in orthogonal cutting (OR)
 - B Explain the different types of tool dynamometer with suitable sketches.
- 22 A Explain the constructional details of boring machine with neat sketch.

B Draw and explain nomenclature of twist drill

- 23 A Explain the constructional details and working principle of milling machine with neat sketch. (OR)
 - B Draw and Explain gear shaper and gear hobbing
- 24 A Write short notes on a) mounting of grinding b) balancing of grinding machine.
 - B Explain the specification and selection of grinding wheel.
- 25 A Explain the constructional features of EDM Wire cut machine with neat sketch. Mention the advantages. (OR)
 - B Explain the constructional features of Ultrasonic machines with neat sketch. Mention the disadvantages



DIPLOMA IN MECHANICAL ENGINEERING

(TOOL& DIE)

L-SCHEME

2011-2012

22044 - COMPUTER AIDED MACHINE DRAWING PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	: DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	: 1220
Subject Code	: 22044
Semester	: IV
Subject Title	: COMPUTER AIDED MACHINE DRAWING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instructions Examination			n		
Computer Aided Hours/ Week r Marks					Duration	
Machine Drawing Practical	5	80	Internal Assessment	Board Examinatio n	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No	Topics	Hours
I	INTRODUCTION TO CAD SOFTWARE	2
II	DRAWING AIDS AND EDITING COMMANDS	5
ш	BASIC DIMENSIONING, HATCHING, BLOCKS AND VIEWS	5
IV	ISOMETRIC DRAWING, PRINTING AND PLOTTING	4
V	CAD DRAWING PRACTICE DETAILED DRAWINGS OF FOLLOWING MACHINE PARTS ARE GIVEN TO STUDENTS TO ASSEMBLE AND DRAW THE SECTIONAL OR PLAIN ELEVATIONS / PLANS / AND SIDE VIEWS WITH DIMENSIONING AND BILL OF MATERIALS USING CAD SOFTWARE – 12 EXERCISES: SLEEVE & COTTER JOINT, SPIGOT & COTTER JOINT, KNUCKLE JOINT, STUFFING BOX, SCREW JACK, FOOT STEP BEARING, UNIVERSAL COUPLING, PLUMMER BLOCK, SIMPLE ECCENTRIC, MACHINE VICE, CONNECTING ROD, PROTECTED TYPE FLANGED COUPLING.	64
	TOTAL	80

RATIONALE:

The contemporary progressing world is fast with the latest production systems. The advanced manufacturing of products is developed instantly using CAD Software. Even a small scale industry is now using a CAD software as it has become the heart of the Design department. So CAD has now become inevitable in industries.

Accuracy and Precision are the two important things that decide the quality of a product to survive its competitors in the market. Using CAD software design, the uniform accuracy, multiples of copies and storing in a small space for long time are assured.

The CAD software considerably improves the creativity and flexibility of a designer. The syllabus here enables a candidate to draw an industrial drawing within the optimum reach of a diploma cadre.

OBJECTIVES:

- Appreciate the need of sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Practice on CAD commands in making 2D Drawings.
- Draw assembled drawings of different types of joints and couplings using CAD.
- Draw assembled drawings of various types of machine elements using CAD.

COMPUTER AIDED MACHINE DRAWING PRACTICAL DETAILED SYLLABUS

Unit	Nomo	of the Tenie	Houro
Unit			
	INTRODUCTION TO CAD SOFT		2Hrs
	Introduction – History of CAD –	Applications – Advantages over manual	
	drafting – Hardware requirement	s – Software requirements – Windows	
	desktop – CAD screen interface -	- menus – Tool bars – How to start CAD	
	 How to execute command – type 	pes of co-ordinate systems – Absolute –	
	Relative – Polar.		
II	DRAWING AIDS AND EDITING (COMMANDS	5Hrs
	Creating objects (2D) – Using dra Donut, Polygon, Point, Pline, Ske text – Dtext, Mtext, Text styles – Osnap options – drafting setting Snap, Grid, Ortho lines – Function Object selection methods – Era	w commands – Line, Arc, Circle, Ellipse, tch, Trace – Creating 2D Solid. Creating Mline, spline – Drawing with precision – s –limits – Units – drawing aids – Fill, h keys - Editing and modify commands – sing object – Oops - Cancelling and	
	Mirror – Break – Trim – Extend – Lengthen – Changing propertie	- Explode. Divide – Measure – stretch – s – Color – line types –LT scale –	
	Matching properties – Editing with	grips – Pedit – Ddedit – Mledit.	
	BASIC DIMENSIONING, HATCH	ING, BLOCKS AND VIEWS	5Hrs
	Basic dimensioning – Editing Dimension system variables. Ma blocks – Wblock – inserting a bloc types – Boundary hatch – workin display – Blipmode – View grou regenauto, pan, viewres – Real area – Distance – Time – Status c	dimensions – Dimension styles – achine drawing with CAD. Creation of ck – Block attributes – Hatching –Pattern ng with layers - Controlling the drawing up commands – Zoom, redraw, regen, time zoom. Inquiry groups – calculating of drawing – Using calculator.	
IV	ISOMETRIC DRAWING, PRINTIN	NG AND PLOTTING	4Hrs
	Isometric drawing – Isometric Dimensioning isometric objects. F plotting drawing – external refer Conversion 3D Drawing : 3D Primitives-Extruct Mesh-3D - Surface-3D Operation-	e projection – drawing isocircles – ile commands – File Import and export – ences – 3D fundamentals – 2D to 3D de – Revolve-Slice-Section, Surface 3D Solid Editing	
V	CAD DRAWING PRACTICE		
	Detailed drawings of following n assemble and draw the sectiona views with dimensioning and bill o 1.Sleeve & Cotter joint 2.Spigot & Cotter joint 3.Knuckle joint 4.Stuffing Box	nachine parts are given to students to al or plain elevations / plans / and side of materials using CAD Software 3D Drawing 1. Geneva Wheel 2. Bearing Block 3 Bushed bearing(Assembly)	
	5.Screw Jack	4. Gib and Cotter(Assembly)	
	6.Foot step bearing	5. Screw Jack(Assembly)	
	7.Universal Coupling		

8.Plummer Block 9.Simple Eccentric 10.Machine Vice 11.Connecting Rod 12.Protected type flanged coupling 13.Practice on Isometric Drawing	Note: Take the orthographic view and sectional view from the above assembled 3D drawing.	
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Reference Books:

- 1) Inside AutoCAD D. Raker and H. Rice BPB Publications, NewDelhi
- 2) Engineering Drawing and Graphics + AutoCAD K.Venugopal, New Age International Publications
- 3) CAD/CAM/CIM P. Radhakrishnan, S. Subramaniyan and V.Raju New Age International Publications.
- 4) AutoCAD 2002 with Applications Sham Tickoo Tata Mcgraw Hill.
- 5) Computer Graphics, Prentice Donald Hearn, M. Pauline Baker Hall of India Pvt. Limited, NewDelhi.

LIST OF EQUIPMENT

- 1. Personal computer (With latest processor to suit Auto CAD) 30 No's
- 2. MS Windows OS 30 No's
- 3. AutoCAD software (release 2000 or above) 30 Users

Board of Examination

Part A (I to IV units)		
One Mark question contain	-	1 x 10 = 10 Marks
Part B – V Unit		
 Assembled view of a given drawing- (2 or 3 views) 		45 Marks
2. 3D drawing using 3D commands	_	15 Marks
Viva voce -		5 Mark
IOIAI		75 Marks

Note to the examiner:

Part A

- Answer any 10 questions out of 15 questions.
- Fifteen questions should cover the complete syllabus (UNIT I to IV)

Part-B

- Answer should be evaluated from the print out for the Part-B questions.(1 & 2).
- Examiner should set the question paper to cover the complete syllabus of Unit-V. (Unit-V – 13 Drawings for Part-B 1st question).
- Examiner has to ask the student to answer any one question from the lot of 13 drawings.
- Examiner has to set the no. of questions minimum 13 even one batch of students contains less than 13.
- 3D Drawing creations the examiner should set the question paper to cover the complete syllabus of Unit-V. (Unit-V 5 3D Drawings for Part-B 2nd question).



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22245-MECHANICAL MATERIAL TESTING PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22245
Semester	:	IV
Subject Title	:	MECHANICAL MATERIAL TESTING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
		Hours/ Semester				
SUBJECT	Hours/ Week		Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
MECHANICAL MATERIAL TESTING PRACTICAL	4	64	25	75	100	3

OBJECTIVES

- > Able to determine various strengths of Different Materials.
- > To calculate the Young's modulus and Shear modulus of the given material.
- > To conduct Bend Test using the given specimen.
- > To differentiate hardness and toughness of the given Ductile and Brittle Materials.
- > To detect cracks on the given specimen
- To handle Rockwell & Brinell hardness tester to determine the Hardness of the given material.
- To observe the microstructure of ferrous and non ferrous metal using metallurgical microscope.

Detailed Syllabus

Part – A

- 1. Estimation of Tensile Strength of the Ductile material –Mild steel
- 2. Estimation of Tensile Strength of Brittle material Cast Iron
- Estimation of shear strength of Mild steel specimen under (i) Single shear and
 (ii) Double shear condition
- Estimation of Toughness of mild steel specimen using (i) Izod impact test
 (ii) Charpy impact test
- 5. Torsion test on mild steel relation between torque and angle of twist, determination of shear modulus and determination of elastic constants for mild steel.
- 6. Determination of stiffness, modulus of rigidity, strain energy stored and shear stress by load deflection method on the coil springs.
- 7. Determination of Young's modulus of steel by deflection test.
- 8. Determine the ductility of the given specimen using Bend Test.

Part – B

- 10. Determination of hardness of Mild steel, copper, aluminium, OHNS and HCHCr using Rockwell harness tester
- 11. Determination of hardness of Mild steel, copper, aluminium, OHNS and HCHCr using Brinell hardness tester
- 12. Study of Metallurgical microscope and grain structures.
- 13. Preparation of specimen for study of micro structure of ferrous metals
- 14. Examine the micro structure of metal samples (i) Ferrous and (ii) Non- Ferrous.
- 15. Detection of Cracks in casting using Detection methods.
 - i. Visual Inspection and ring test
 - ii. Die penetrant test
- 16. Detection of Cracks in casting using Magnetic particle test

SCHEME OF EXAMINATION:

Part A (1½ Hours)	: 35 marks
Part B (1½ Hours)	: 35 marks
Viva-Voce	: 05 marks

Total : 75 marks

SCHEME OF VALUATION:

Observation / Reading	-	10 marks
Tabulation / Formula	-	10 marks
Calculation & Result	-	15 marks

DIRECTORATE OF TECHNICAL EDUCATION DETAILS OF THE EQUIPMENTS

NAME OF THE BRANCH / COURSE	MECHANICAL ENGINEERING
	(TOOL & DIE)
YEAR	SECOND
SEMESTER	IV
	22245 MECHANICAL MATERIAL TESTING
NAME OF THE LABORATORY	PRACTICAL

S.NO	LIST OF THE EQUIPMENTS	QUANTITY REOUIRED
1	Universal Testing Machine(UTM)	1
2	Rockwell Hardness Testing machine	1
3	Torsion testing machine	1
4	Defection testing machine	1
5	Impact test machine	1
6	Torsion testing arrangement	1
7	Shear testing machine	1
8	Brinell hardness testing machine	1
9	Metallurgical microscope	2
10	Metallurgical specimens	1 set
11	Double disk polishing machine	1
12	Electro magnetic crack detector with its accessories	1



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22246 - HYDRAULICS AND PNEUMATICS PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22246
Semester	:	IV
Subject Title	:	HYDRAULICS AND PNEUMATICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

SUBJECT	INTRO		EXAMIN	ATION		
	Hours/week Hours/semester Marks			Duration		
HYDRAULICS						
AND			Internal	External	Total	
PNEUMATICS	5	80	25	75	100	3 Hrs
PRACTICAL						

Objectives:

- Study Pneumatic system and its functioning
- Study Hydraulic system and its functioning
- Control operation of cylinders using metering in and metering out control
- Design and operate application oriented pneumatics circuits
- Design and operate application oriented hydraulic circuits
- Use special purpose valves such as shuttle valve and quick exhaust valve
- Compare the functioning of pneumatic and hydraulic systems

Trouble shoot in pneumatic and hydraulic circuits

Note: The students should be trained in Pneumatics and Hydraulics and all exercises should be completed. The students should maintain a Record Note book and submit the bonafide record for Board Practical Examination. Examination has to be conducted in Pneumatics and Hydraulics.

Pneumatic System

- 1. Study of Pneumatic System and its elements.
- 2. Direct operation of a Single Acting Cylinder.
- **3.** Direct operation of a Double Acting Cylinder.
- 4. Operation of a Single Acting Cylinder controlled from two different positions using Shuttle Valve.
- 5. Operation of a Double Acting Cylinder with quick return using quick exhaust valve.
- 6. Controlling the speed of a Double Acting Cylinder using metering –in and metering –out controls.
- 7. Automatic operation of a Double Acting Cylinder using limit switch and memory valve.

Hydraulic System

- 1. Study of hydraulic System and its elements.
- 2. Direct operation of a Double Acting Cylinder.
- 3. Direct operation of a Hydraulic motor.
- 4. Controlling the speed of a Double Acting Cylinder using metering-in and metering-out type control.
- 5. Sequencing of two cylinders using Sequence Valve.
- 6. Regenerative Circuit.
- 7. Counter-Balance circuit.

Board Examination

Evaluation

Scheme of Practical Examination

MARKS

Pneumatics	: Any one exercise	Duration : 1 ½ HRS	35
	Pneumatic Circuit	– 15 marks	
	Connection as per circuit	– 15 marks	
	Execution of circuit	– 5 marks	
Hydraulics	Any one exerciseHydraulic Circuit	Duration : 1 ½ HRS – 15 marks	35
	Connection as per circuit	– 15 marks	
	• Execution of circuit	- 5 marks	
Viva-Voice):		05
Internal As	ssessment:		25
	TOTAL:		100

Resources Required

- 1. Pneumatic system with necessary DCV, FCV and Actuators.
- 2. Hydraulic system with necessary DCV, FCV and Actuators.



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22247 - TOOL ROOM SPECIAL MACHINES PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22247
Semester	:	IV
Subject Title	:	TOOL ROOM SPECIAL MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
		Hours/ Semester	Marks			
SUBJECT	Hours/ Week		Internal Assessmen t (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
TOOL ROOM SPECIAL MACHINES PRACTICAL	6	96	25	75	100	3

OBJECTIVES:

- Identify a milling machine and its parts
- Identify a cylindrical grinder, surface grinder and tool and cutter grinder
- Identify Shaping machine and its parts
- Identify the tools and instruments
- Handle the different types of work holding devices
- Machine a component using different machine tools.
- Calculate the indexing for a work

Syllabus

- 1. Introduction to shaping machine and its parts
- 2. Introduction to milling machine and its parts.
- 3. Introduction to grinding machine and its parts
- 4. Introduction to work holding devices.
- 5. Types of cutter used in milling machine
- 6. Types of grinding wheels used in grinding machines
- 7. Setting of work, tools and cutters in shaping, milling and grinding machines
- 8. Operations performed in shaping, milling and grinding machines

EXERCISES:

- 1. Machine a cube by using shaping machine
- 2. Machine a square block from round rod using Milling machine
- 3. Machine a 'V' Block using Milling machine
- 4. Machine Groove cuts using Milling machine
- 5. Grind a plain surface using surface Grinder
- 6. Grind a cylindrical surface using Cylindrical Grinding machine
- 7. Grind a Progressive type Plug gauge using Cylindrical Grinding machine
- 8. Machine a Spur Gear using milling machine by Simple Indexing
- 9. Machine a Helical Gear using milling machine.
- 10. Machine a Hexagon by straddle milling process using milling machine
- 11. Grind a Facing Tool using Tool and Cutter Grinder
- 12. Grind a Parting Tool using Tool and Cutter Grinder

SCHEME OF EXAMINATION

Milling / Grinding/Shaping	: 70 marks
Viva-voce	: 05 marks
Total	: 75 marks

Note: Sketches enclosed

TOOL ROOM SPECIAL MACHINES PRACTICAL - SKETCHES

Time: 6Hrs/ Week No of weeks: 16 Total Hrs: 96

Note: All dimensions in mm

Note to the faculty :-Last job of the raw material (MS Rod Ø32x33mm, MS Rod Ø25x98mm and 13x13x75 mm MS square rod) to be retain in student wise or batch wise(not more than 2 students) .This may be verifiable at the time of Board Practical Examination by the external examiner

EXERCISE NO:1 SHAPING A PLAIN SURFACE

RAW MATERIAL SIZE:52 MM CI (OR) MS CUBE

MANUFACTURE A SQUARE BLOCK USING SHAPING MACHINE.



ALL DIMENSIONS ARE IN mm

EXERCISE NO:2 MILLING ROUND TO SQUARE

RAW MATERIAL SIZE:Ø32X33 mm MS ROUND MANUFACTURE A MAXIMUM SIZE SQUARE BLOCK FROM GIVEN ROUND ROD USING MILLING MACHINE.



EXERCISE NO:3

RAW MATERIAL SIZE:22 X33

MACHINE A V BLOCK BY USING MILLING MACHINE



ALL DIMENSIONS ARE IN mm

EXERCISE NO:4 GROOVE MILLING

RAW MATERIAL SIZE:22X33

MACHINE THE REQUIRED GROOVES BY USING MILLING MACHINE



EXERCISE NO:5 SURFACE GRINDING RAW MATERIAL SIZE:75X50X12 mm MS FLAT

GRIND THE PLAIN SURFACE TO AN ACCURACY OF 0.01mm BY USING SURFACE GRINDING MACHINE.



ALL DIMENSIONS ARE IN mm

EXERCISE NO:6 SURFACE GRINDING (right angle grinding) RAW MATERIAL SIZE:FINISHED WORK PIECE OF EX.5 GRIND THE SIDES OF THE WORKPIECETO 90°BY USING SURFACE GRINDING MACHINE WITH THE AID OF ANGLE PLATE, PARALLEL BLOCKS&CLAMPS.



EXERCISE NO:7 CYLINDRICAL GRINDING RAW MATERIAL SIZE:Ø32X150 MM MS POLISH ROD

GRIND THE CYLINDRICAL COMPONENT TO AN ACCURACY OF 0.02MM BY USING CYLINDRICAL GRINDING MACHINE



EXERCISE NO:8 CYLINDRICAL GRINDING (internal grinding) RAW MATERIAL SIZE:Ø32X50 MS POLISH ROD. GRIND L THE INTERNAL SURFACE OF THE CYLINDRICAL OBJECTBY USING CYLINDRICAL GRINDING

MACHINE WITH THE AID OF ID GRINDING HEAD AND SUIT THE BORE WITH Ø24 END OF EX NO 7.



EXERCISE NO:9 CYLINDRICAL GRINDING **RAW MATERIAL SIZE: FINISHED WORKPIECE OF EX.NO:6**

MANUFACTURE A PROGRESSIVE TYPE PLUG GAUGE BY USING CYLINDRICAL GRINDING



EXERCISE NO:10 SPUR GEAR MILLING RAW MATERIAL SIZE:FINISHED WORKPIECE OF EX.NO:7

MACHINE A SPUR GEAR BY USING MILLING MACHINE



ALL DIMENSIONS ARE IN mm

EXERCISE NO:11 HELICAL GEAR MILLING RAW MATERIAL SIZE:FINISHED WORKPIECE OF EX.NO:8

MACHINE A HELICAL GEAR BY USING MILLING MACHINE



ALL DIMENSIONS ARE IN mm

EXERCISE NO:12 HEXAGON MILLING RAW MATERIAL SIZE:FINISHED WORKPIECE OF EX.NO:8

MACHINE A HEXAGON BY STADDLE MILLING USING MILLING MACHINE



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TOOL AND CUTTER GRINDING

Exercise No:13- Facing Tool (Tool and Cutter Grinder)



Raw Material:13x13x75

Exercise No: 14- Parting Tool (Tool and Cutter Grinder) Raw Material: 13x13x75





LIST OF EQUIPMENTS

MACHINES:

- 1. Vertical milling machine/vertical milling attachment in Universal Milling Machine 2 No's
- 2. Universal Milling Machine with indexing head- 2 Nos
- 3. Surface Grinding Machine (Horizontal) 1 No
- 4. Cylindrical Grinding machine 1 No
- 5. Tool and Cutter grinder 1 No
- 6. Shaping machine -1 no

Equipments & Tools:

- 1. Milling Cutter (2 Module cutter) & accessories complete sets
- 2. Milling Machine Handle and required accessories 2 sets
- 3. Grinding wheel OD 150 mm , ID 1"(AA-65, K5, V8) 2 No's
- 4. Grinding wheel OD 300 mm , ID 150mm(AA-56, K5, V8) 1 No





DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22251 - JIGS , FIXTURES AND GAUGES

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22251
Semester	:	V
Subject Title	:	JIGS, FIXTURES AND GAUGES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination				
SUBJECT	Hours/	Hours/ Semester	Marks			Duration	
0020201	Week		Internal	Board	Total	(Hrs)	
			Assessment Examination				
JIGS , FIXTURES AND GAUGES	5	80	25	75	100	3	

TOPICS AND ALLOCATION OF HOURS:

Unit No	Topics	Time Hours
Unit – I	Basics of Jigs and Fixtures	15 Hours
Unit – II	Principles of Location and Clamping	15 Hours
Unit – III	Jig Bushings and Drill Jigs	15 Hours
Unit – IV	Principles of Fixture Design	15 Hours
Unit – V	Gauges	15 Hours
	Revision and Examination	5 Hours
	Total	80 Hours

Rationale:-

In the present competitive environment, elimination of non productive time in the processes is essential to improve productivity. For improving the productivity in the engineering industries various types of production tools Viz., Jigs, Fixtures, Gauges etc., are employed wherever necessary /possible. Hence thorough knowledge on the principles, construction and working principle of various Jigs, Fixtures and gauges is absolutely essential.

OBJECTIVES

- Identify the Difference between Jig & Fixtures
- Study the plane of movements
- Explain possible freedom of movement of job in a jig, fixtures
- Study locating of work piece in a jig, fixture
- To understand the construction of various types of Jigs and Fixtures
- Explain mounting of jig on a machine tool
- Explain mounting of fixtures on the machine tool
- Design jig and fixtures
- Design of plug and snap gauges

22251 -JIGS, FIXTURES AND GAUGES

DETAILED SYLLABUS

Contents: Theory

Unit No.	Name of the Topic	Hours
Ι	BASICS OF JIGS AND FIXTURES Introduction – Jigs and Fixtures – Difference between Jigs and Fixtures – Advantages of Jigs and Fixtures – Elements of Jigs and Fixtures – Fool Proofing – Materials used in Jigs and Fixtures – Degrees of freedom - 12 degrees of freedom – 6 points location principle (or) 3-2-1 principle of location - Essential features of Jigs and Fixtures– General Design Principles – Design steps – Common defects in Jig Design.	15
II	PRINCIPLES OF LOCATION AND CLAMPING Principles of location – location point – types of locators – pins and studs – V block – cup and cone location points – adjustable locating points – special adjustable stops – location from finished holes in the work – Diamond pin locator – Cam operated 'V' locator – Quick action 'V' locator. Principles of clamping – types of clamps – lever clamp – hinged clamp – two way clamp – Swinging clamp – wedge clamp – eccentric clamping arrangement – Quick action clamp – Cam operated clamp - Quarter turn screw – Toggle clamp – Pneumatic and Hydraulic clamps – Washers- 'C ' Washer – Spherical and flat Washers.	15
III	JIG BUSHINGS AND DRILL JIGS Jig Bushings: Materials for Jig bushing – press fit bushings – Fixed renewable bushings – slip renewable bushings – liner bushings – screw bushings - miscellaneous type of drill bushings – bushing specifications. Drill Jigs: Open drill jig – plate drill jig – template drill jig – channel drill jig – turn over drill jig – angle plate drill jig – closed box drill jig – leaf drill jig – Post jig – Pot jig - indexing drill jig – universal drill jig – design of template and leaf jigs.	15

Unit No.	Name of the Topic	Hours
IV	PRINCIPLES OF FIXTURE DESIGN Introduction: principles of fixture design – elements of fixtures – design consideration of locators and clamps for fixtures – types of fixtures – Design of turning fixtures - Mandrels – Type of mandrels - Boring fixtures – Milling fixtures – essentials of milling fixtures - method of locating milling fixtures with respect to cutter position – Grinding fixtures – surface grinding and cylindrical grinding fixtures - Broaching fixtures – Internal and External broaching fixture - Welding fixtures - consideration for welding fixtures – Study of Assembly and Inspection fixtures. Fixtures for CNC machines and concept of modular tooling.	15
v	GAUGES Introduction – limit gauges –Taylor's principle of limit gauging – Application of limit gauges – gauge makers tolerance – allowance for gauge wear – material for limit gauge – three basic types of limit gauges – Disposition of gauge tolerance and wear allowance – plug gauge – snap gauge – ring gauge – thickness and length gauges – recess gauge – step gauge – position and receiver gauges – IS specifications for gauges – Design of plug and Snap gauges.	15

Text Books:

1. Donoldson.C and Others, "Tool Design", Tata McGraw Hill, 1978

2. Kempster, "Introduction to Tool Design and Jigs and Fixtures", ELBS References Books:

- 1. ASTME, "Hand book of Fixture Design"
- 2. Korsakov, "Fundamental of Fixture Design", MIR Publication, Moscow
- 3. Goroshkin.A.K., "Jigs and Fixtures Handbook", MIR Publication, Moscow Houghton, "Jigs & Fixture Design

22251 - Jigs, Fixtures and Gauges MODEL QUESTION PAPER - 1

Time : 3 Hrs

Max. Marks : 75

PART – A

1x15=15

- 21. Define JIG?
- 22. Define fixture?

Answer any fifteen questions

- 23. What is fool proofing?
- 24. What is DOF?
- 25. What is meant by locating?
- 26. What is the purpose of "V" locators?
- 27. Name any five clamps?
- 28. What is the purpose of pads fixed with clamp faces?
- 29. What are the materials used for JIG bushes?
- 30. What is the function of slip renewable bush?
- 31. Specify a JIG bush with neat sketch?
- 32. What are the types of drill JIGs?
- 33. Name any four fixtures?
- 34. What is tennon block?
- 35. In which fixture work horn is used?
- 36. What is the purpose of spatter grooves?
- 37. What is limit gauge?
- 38. What are the three basic types of limit gauges?
- 39. What are the materials used to manufacture the limit gauge?
- 40. Sketch a ring gauge neatly?

PART – B

Answer all the Questions 5x12=60 41. (A)(i) Explain 3-2-1 principle of location with neat sketch (8)(II) What are the common defect caused while design a JIG? (4)(OR) (B) (I) What are the principles of locating and clamping? (8)(ii) Explain quick acting clamp with neat sketches (4) 42. (A) (i) Explain linear bush and slip renewable bush with neat sketches (6)(ii) Explain indexing Jig with neat sketch (6) 43. (A) Write short notes on (8) i) Location of work piece with respect to Cutter position ii) Design features for turning fixtures (B) What are the design features for welding fixtures (4)
44. (A) (i) Explain in detail the design of Turning fixtures.(12 marks)

(OR)

(ii) Sketch and explain (i) Broaching fixtures (ii) Concept of modular tooling.(12 marks)

- 45. (A) Write short notes on
 - i) Taylor's principle for gauge design
 - ii) Sketch and explain a snap gauge
 - (B) What are the IS specification for gauge?

(4)

(8)

22251 - Jigs, Fixtures and Gauges MODEL QUESTION PAPER - 2

Time : 3 Hrs

Max. Marks : 75

PART – A

1x15=15

- 1. What is the main difference between a Jig and a Fixture?
- 2. What is degree of freedom?
- 3. Name the elements of a Jig.

Answer any fifteen questions

- 4. Why jig or fixture is used in mass production?
- 5. Name the types of locators used in jig design.
- 6. What is quick acting clamp?
- 7. What is redundant location?
- 8. When adjustable locators are used?
- 9. Why jig bushes are used?
- 10. What is the type of fit between Jig bush and Jig plate?
- 11. How a jig bush is specified?
- 12. When liner bushes are used
- 13. What is tennon?
- 14. What is the use of cutter setter in milling fixtures?
- 15. When mandrels are used?
- 16. Why turning fixtures are balanced?
- 17. What is the advantage of using limit gauges.
- 18. How limit gauges are classified?
- 19. What is wear allowance
- 20. What is MMC?

PART – B

Answer all the Questions

- 21. (A)(i) Explain the advantages of jigs and fixtures (6)
 - (II) Explain the concept of fool proofing with a sketch (6)

(OR)

- (B) Explain in detail the general design principles adopted in jig design. (12)
- 22. (A)(i) Sketch and explain quick action 'V' Locator(6)
 - (II) Sketch and explain cam operated clamp (6)

5x12=60

(OR)

(B) Sketch and explain (i) Toggle clamp. (ii) Quarter turn screw(12)

23. (A)(i) Explain the various materials used for jig bushes (6)

(II) Sketch and explain turn over drill jig. (6)

(OR)

(B) Sketch and working of explain the construction of Indexing drill jig (12)

24. (A)(i) What are the factors to be considered in designing a milling fixture (6)(II) Explain the concept of modular tooling (6)

(OR)

(B) Sketch and explain a welding fixture. (12)

25. (A)(i) Explain the Taylors principle of gauging (6)

(II) Sketch and explain Plug gauge and snap gauge (6)

(OR)

(B) Explain (i) Position and receiver gauge (ii) Ring gauge. (12)



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME

2011 - 2012

22252 - PRESS TOOLS

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22252
Semester	:	V
Subject Title	:	PRESS TOOLS

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

Instructions		Examination				
			Marks			
SUBJECT	Hours/ Week	Hours/ Semester	Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
PRESS TOOLS	5	80	25	75	100	3

Topics and Time allocation

UNIT	TOPIC	TIME
		(Hrs)
I	Press working fundamentals, operations, and machinery	15
II	Press & Press Tool Accessories And Types Of Die Construction	15
	Bending And Forming Dies	15
IV	Drawing Dies And Dies For Secondary Operations	15
V	Fine Blanking Tool And Specialized Press Tool Applications	15
	Revision, Test	5
	Total	80

Rationale:

Modern development of sheet metal industries require more understanding of production of sheet metal products and the machinery and tools involved in the production of the sheet metal products. This subject Press Tools will develop the basic knowledge on the essentials of the production of sheet metal products, the machinery and Tools involved in its production.

OBJECTIVES

The objective of this course is to make the Student:

- To understand the fundamentals of press working, to be familiar with the various press working operations and machines.
- > To learn the safety in press working operations.
- > To be familiar with the various press and press tool accessories
- > To learn about the different types of Die construction.
- To know the various bending, forming and other miscellaneous press working operations.
- > To learn about the construction and operation of the different bending dies.
- > To be familiar with the various drawing and other related processes
- > To know the construction and operating principle of drawing and combination dies.
- > To know the basic concepts and the advantages of fine blanking process
- > To learn the construction and working principle of various fine blanking dies.
- To learn about the concepts of SMED and quick die changes and its advantages in bringing down the press set up time.
- > To learn to trouble shoot in various press tools.
- > To be familiar with the specialised press tool applications.

22252 - PRESS TOOLS

DETAILED SYLLABUS

UNIT NO	Name of the Topic	Hours
1	 PRESS WORKING FUNDAMENTALS, OPERATIONS, AND MACHINERY : Theory of cutting sheet metal:- Analysis of cutting, clearance, cutting terminology, stages of cutting, penetration, burr. Effects of clearance variation – Secondary shear, large clearance, clearance selection, typical force curves. Other cutting characteristic – Dish distortion, spacing distortion, typical wear. Forces for cutting sheet metal – Cutting with square faces, cutting with shear, shear on punch, slug bending force, shear on die steel, stripping force. Press working operations:- Operation for producing blanks – Shearing, cutting off, parting, blanking. Operation for cutting holes – Punching, piercing, slotting, perforating. Operations for progressive working – Notching, semi notching, lancing, parting, cutting off. Operations for size control – Trimming , slitting, shaving. Safety in press working. Press working mechanism:- Presses according to their functions – energy producing press, force producing presses, stroke controlled presses. Press according to their energy supply – Mechanical, hydraulic, Pneumatic, electromagnetic presses. Presse according to their construction – Solid or gap frame, open back inclinable, knee frame, horning, open end or end wheel. Press according to their operation – Single action, double action, triple action, multi slide press. 	15
	height adjustment, strokes per minute, die space. Special purpose presses – Dieing press, spotting press, press brake, gang punching press, automatic press, transfer press, multi slide machine	
II	 PRESS & PRESS TOOL ACCESSORIES AND TYPES OF DIE CONSTRUCTION Mechanical handling devices:- Feeding and reeling mechanisms for coiled sheet metal – Reels and cradles (decoiler) , roll feeds and its types, hitch feeds. Feeding mechanism for individual parts – Hopper feeds, dial feeds, chutes, slides, magazine feeds, step feeds, special feeds. Ejection mechanism – Gravity, air, kicker, lifter, shovel, mechanical hand, ejection 	15
	by next part. Transfer mechanisms – Conveyors, shuttle, turnover, turnaround, stacker, rails. Types of die construction: Cut off drop through return type compound	
	combination, continental, sub press, follow die, progressive die, transfer die, shuttle die. Function and nomenclature of die components:- Die, die set, die plate, punch, stripper plate, Die spring, rubber keeper, stripper bolt, solid stripper, knockout plate, hold down plate, pad plate, blank holder, pressure pin, die cushion. Attachment components – Dowel, screw, key. Miscellaneous components – Heal, stop block, bolster plate, backing plate, pilot, gauges, insert, cams, hinges and rockers. Commercially available die components – Die sets, die set attachment devices, punches, die buttons, retainers, springs, fluid springs, die cushion and its types.	

111	 BENDING AND FORMING DIES:- Bending of sheet metal – Bending theory, neutral axis, metal movement, spring back, methods of overcoming spring back. Bending Operations – Bending, flanging, hemming, curling, seaming, corrugating. Types of Bending dies (construction and working principle) – V bending and its types, edge bending, u bending. Bending operations done using press brake. Forming operations – Embossing, bulging, crimping, tube forming. Miscellaneous press working operations – slugging, restrike or spank, extrude (holes), coining, hot trimming, cold trimming of die castings and plastic mouldings, riveting, burnishing or sizing, Ironing. Forming dies – Construction and working principle of solid form dies, pad form dies, curling dies, embossing dies, coining dies, swaging dies, bulging dies. Assembly dies - Riveting, tab stake, upset stake, crimping. 	15
IV	 DRAWING DIES AND DIES FOR SECONDARY OPERATIONS Drawing operations – Shallow drawing, deep drawing. Analysis of cup drawing: Stages of drawing - Bending, straightening, friction, compression, tension, stretch forming. Variables of drawing - Bending and straightening variables, friction variables, compression variables, stretch forming variables, analysis of draw speed. Draw dies &its construction and working principle – Conventional draw die, redrawing die, reverse re drawing die, drawing of square or rectangular shapes. Drawing with flexible tooling – Marform process, Hydro form process, Hydro dynamic process, Verson- wheelon process. Draw die details – Blank holders blank holding pressure and its importance, air vents, drawing inserts, draw beads. Drawing defects, causes and remedies. Dies for secondary operations: - Construction and working principle of – Semi piercing dies, shear form dies, dies for formed contours, notching die, shaving die, side piercing die. 	15
V	 FINE BLANKING TOOL AND SPECIALISED PRESS TOOL APPLICATION S Fine blanking basics:- Definition and Applications of fine blanking, Working principle of fine blanking tool, V Ring – function of V ring, Dimensions of V ring. Comparison of fine blanking with blanking. Strip width and margin calculations, Calculation of press, Fixing minimum distance from die aperture. Factors affecting Tool life. Importance of punch and die radius. Materials suitable for fine blanking, work hardening during fine blanking, steel, copper and copper alloys, aluminum and aluminum alloys. Fine Blanking Machines:- Working principle – Ram movement, Drive systems-Mechanical drives, hydraulic drives, Machine force, Ring indenter force, counter force. Fine blanking tools:- Different types of tools – Compound die tooling system with sliding punch, compound die tooling with fixed punch. Clearance calculation – Importance of clearance. Specialized Press Tool Applications:- Construction, advantage and applications of advanced multistage tooling, unit tooling, angular piercing tools, CNC turret press. Principle or Quick Die Change (QDC) – need and advantages. Factors Affecting Tool Service Life:- Introduction, Elements of Tool performance, Procedure for investigation of tool failure, Trouble shooting in press tools, effect of heat treatment on service life of tools. 	15
	REVISION AND TEST	05

Text Books:

- 1. Donald F. Eary., Edward A. Reed, Techniques of Press working sheet metal, Prentice-Hall,Inc., Second Edition, 1974
- 2. Donaldson, Tool Design , Tata McGraw-hill Book company, 23rd edition, 2006.

 $3.\$. D.Eugene ostergaard, Advanced die making, McGraw-Hill Book company. References:-

1. Dr.John G.Nee, Fundamentals of Tool Design, Society of Manufacturing Engineers, Fourth Edition, 1998.

2. ASTME National Book Committee, McGraw-hill Book company, 1985.

3. J.R.Paquin, Die design fundamentals, Industrial Press Inc, 1990.

4. D.Eugene ostergaard, Basic die making, McGraw-hill Book company, 1990.

5. Ivana Suchy, Hand book of Die Design, McGraw-Hill Book company, Second edition, 1997.

6. American Society of Metals – Hand book – Volume 4 (Forming), 8th Edition

7 www.metalformingmagazine.com

8. www.sme.org

22252 - PRESS TOOLS MODEL QUESTION PAPER

Time : 3 Hrs

PART – A

Max. Marks : 75

Answer any fifteen questions

1x15=15

- 1. What are stages of cutting in press working?
- 2. What are the causes of clearance?
- 3. How presses are classified
- 4. Define shut height
- 5. What are the types of feeding devices used in press working?
- 6. What is the function of stripper plate?
- 7. What is the function of Blank holder?
- 8. What are the types of die sets?
- 9. Define spring back
- 10. What are the types of bending dies?
- 11. Define embossing
- 12. Write down the types of forming die?
- 13. Define drawing
- 14. What are drawing variables?
- 15. What is blank development?
- 16. Name any three secondary operations
- 17. What is fine blanking
- 18. What is the purpose of "V" ring?
- 19. What are the suitable materials for fine blanking?
- 20. What is SMED?

PART – B

Answer all Questions

5x12=60

- 21. A (i) Explain Shear action in die cutting with neat sketch (6)(ii) Explain the effect of clearance in brief (6)
 - (OR)
 - B. Sketch and explain transfer press (12 marks)

22. (A) Write short notes on

- i) Hopper feeding mechanism(6 marks)
- ii) Bolster plate (6 marks)

(OR)

(B) Explain Combination die with neat sketch (12 marks)

- 23. (A) Explain spring back and methods of overcoming spring back with neat sketches (12 marks)
 - (OR) (B) Explain Solid form die with neat sketch (12 marks)
- 24. (A) Explain in detail the variables that affect the quality of the drawn part. (12 marks) (OR)
 - (B) Sketch and explain (i) Verson wheelon process and (ii) Marform process.
- 25. (A) Sketch and explain a compound type fine blanking tool with sliding punch.(12 marks) (OR)
 - (B) Explain in detail the need and advantage of Single Minute Exchange of Dies.(12 marks)

22252 - PRESS TOOLS MODEL QUESTION PAPER-2

Time : 3 Hrs

Max. Marks : 75

PART – A

Answer any fifteen questions

- **1.** What is piercing?
- 2. What is shut height of a press?
- **3.** What is slitting?
- **4.** Define the term stripping force?
- 5. Name the feeding devices used in press working.
- 6. What are the material transfer mechanisms used in press shops?
- 7. What is the purpose of a dowel in a press tool?
- 8. What is pilot?
- **9.** What is neutral axis?
- **10.** Define hemming.
- **11.** What is crimping?
- 12. What is spring back?
- 13. What is deep drawing?
- 14. What is drawing speed?
- 15. What is blank holding pressure?
- 16. What is the purpose of air vents?
- **17.** Write the advantages of fine blanked parts?
- 18. What are the factors affecting tool life?
- **19.** What is the need for quick die change?
- 20. What is the advantage of Single minute exchange of dies?

PART – B

Answer all Questions

21. A (i) Explain safety in press working operations (6)(ii) Explain principle of electromagnetic press

(OR)

- B. Sketch and explain the construction and working principle of triple action press (12)
- 22. A (i) Explain how hitch feeding mechanism works (6)
 - (ii) Explain the operation of stacker (6)

(OR)

5x12=60

(6)

B. Sketch and explain the construction and working principle of transfer die (12)

23. A (i) Explain seaming and corrugating operations (6)(ii) Explain crimping and tube forming operations (6)

(OR)

- B. Sketch and explain the construction and working principle of riveting die (12)
- 24. A (i) Explain the redrawing operation with a line sketch (6)(ii) Explain the hydro dynamic process (6)

(OR)

- B. Sketch and explain the construction and working principle of a semi piercing die (12)
- **25.** A Sketch and explain the working principle of a fine blanking machine (12)

(OR)

B. Sketch and explain a compound type fine blanking tool with fixed punch (12)



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22253 - FORGING DIES AND DIE CASTING DIES

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22253
Semester	:	V
Subject Title	:	FORGING DIES AND DIE CASTING DIES

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

		Instructions		Examination			
					Marks		
S	UBJECT	Hours/ Week	Hours/ Semester	Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
FORGING DIES AND DIE CASTING DIES		5	80	25	75	100	3
Topics a	Ind Allocation o	f Hours:					
SI. No.	TOPIC						TIME
							(1.1

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		(Hrs)
1	Introduction To Forgings, Forging Processes and Forging Machines	15
П	Design Of Drop Forging, Press Forging and Machine Forging Dies	15
Ш	Die Casting Processes, Materials and Machines	15
IV	Die Casting Die Design, Die Steel and Defects	15
V	Die Maintenance and Die Cost Estimation	15
	Revision, Test	5
	Total	80

RATIONALE:

Development and use of Forging & Die casting products is high in industries and requires more knowledge on Forging dies and Die Casting Dies and understand of its processes and the operations. This subject will develop the basic knowledge on Forging and Die casting Dies with the process and the basic operations.

OBJECTIVES:

- Explain the fundamentals of forgings, and forging processes.
- Compare the different types of forging
- Design Drop Forging dies.
- Design press forging and Machine forging dies.
- Explain the basics of Die casting process.
- Explain the working of die casting machines.
- Design die casting die
- State the characteristics of the die steel
- Explain the causes and remedies of die casting defects.
- Practice on estimation and costing of dies
- Estimate the cost of dies

22253 - FORGING DIES AND DIE CASTING DIES

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	 FORGING AND FORGING MACHINES 1.1 Introduction to Forgings:- Uses and advantages of forgings, forged parts Vs cast parts, Forging Temperatures, annealing of forgings, forging properties, forgeability and forgeable metals 1.2 Forging processes – Smith die forgings – Hand forging, Power forging. Impression die forgings – Drop forging, Press forgings, Machine forging. Smith forging operations – Upsetting, drawing down, setting down, punching, bending, welding, cutting, Fullering. Smith forging examples. Power Forging – Power hammers – Helve hammers, Trip hammers, Lever spring hammers, Pneumatic hammers, Steam or Air hammers. Capacity of forging process, forging dies. Drop Forging – Drop hammers – Board hammers, air lift hammers, power drop hammers, capacity of drop hammers. Press forging – Mechanical forging presses, Hydraulic press. Roll die forging – Roll forging, skew rolling, ring rolling. Comparison of press forging Vs hammer forging. Machine or upset forgings. Heat treatment of forged parts 1.3 Heating devices – Box or batch type furnaces, rotary hearth furnaces, continuous or conveyor furnaces, induction furnaces, resistance furnaces. Open fire and stock fire. 	15
I	 DESIGN OF DROP FORGING, PRESS FORGING AND MACHINE FORGING DIES 2.1 DROP FORGING DIE DESIGN:- Hammer dies for preparatory work – fullering dies – edging dies – flattening dies – Drawing down dies – bending die. Essential features of forging dies – generous radii, parting line position, flash gutter, webs and panels, draft, air vents. Flash areas and gutters in finishing dies. Elements of multi impression die block, effect of grain flow. 2.2 PRESS FORGING DIES:- Rating of forging press, steps in press forging dies, design of press forgings, design of press forging dies. 2.3 MACHINE FORGING DIES:- General characteristics, techniques used in making these forgings, machine forging description and range, machine forging tools and operation, design of dies for forging machines Laws governing forging machine die design, Examples of forgings produced on forging machines, forging defects – causes and remedies. 2.4 FORGING DIE BLOCKS AND DIES: Materials and grade of die blocks, applications of various grades of steel used for die blocks and dies-Die instant Da eining af diap. US and for tage for die blocks and dies-Die 	15

111	 DIE CASTING PROCESSES, MATERIALS AND MACHINES 3.1 DIE CASTING PROCESSES:- Hot chamber process, Cold chamber process, low pressure die casting process, advantages and disadvantages, comparison of hot and cold chamber processes, applications, heat transfer in the die and methods of controlling die temperature. 3.2 DIE CASTING MATERIALS:- Types of die casting alloys –metallurgy, melting & casting procedure and application of zinc based die casting alloys, Aluminum base alloys, Magnesium base alloys, , magnesium base alloys, Copper base alloys, Lead base alloys and Tin base alloys. 3.3 DIE CASTING MACHINES:- Plunger machine, air machine, modern cold chamber machines. Die locking methods, injection systems, automatic cycle control, interlock and safety devices in die casting machines. Operation of hot chamber and cold chamber die casting machines. Machine specifications, process parameters and their effect on product quality. Effect of die casting machine on the process – accumulator pressure, injection line pressure, intensification, plunger diameter, locking force, mode of injection, plunger diameter, casting cycle, lubrication. 	15
IV	 DIE CASTING DIE DESIGN, DIE STEEL AND DEFECTS 4.1 DIE CASTING DIE DESIGN: Flow system – Importance, metal flow systems in die casting dies, goose neck, nozzle, sprue, runners systems, shock absorbers, gate, gate area, gate velocity, air vent, overflow, determination of gate area. Procedure to calculate runner and gating dimensions using PQ² diagram, calculating runner and gating dimensions without PQ² diagram. Consideration of specification of die casting machines. Ejection systems – need and working of ejection system, Types of ejection system – sleeve, ring, blade 4.2 DIE STEEL: Characteristics of die steel, die steel for low melting point metal castings, die steel for aluminum and magnesium castings, die steel for copper base alloys. Heat treatment of die casting dies. Factors affecting mould service life – design, tool material, machining, heat treatment, grinding and handling. 4.3 DIE CASTING DEFECTS: Definition, causes and remedies of defects – Shrink holes, Gas holes, Segregation, Shrink cracks, Porosity, Cold shuts, Flow lines & Blooms, Foliations, Hard spots, Surface draws and Depressions, Soldering, sink mark and excessive flash. 	15
v	 DIE MAINTENANCE & DIE COST ESTIMATION 5.1 FINISHING OF DIE CASTING DIES: Trimming and piercing of die casting dies- comparison die casting dies with other products 5.2 DIE MAINTENANCE: Maintenance, safety and storage of forging die tools and material, handling of Dies- Maintenance, safety and storage of Die casting die tools and material, handling of Dies 5.3 DIE COST ESTIMATION: Trends in sheet metal manufacturing, Basic approach to cost estimation – pricing history, work intensity history, additional costs, mach inability of materials, cost of materials, evaluation. Die building estimates, Design and development costs. Estimate format and terminology – Delivery timing, packaging and shipping, extra costs and regulations. 	15
	TEST & REVISION	5

Reference Books:-

- 1. Meswani., and R.H.Dattani, Design and Manufacture of forging dies
- 2. Kamenshichikov, S.Koltun and V.Naumov, Forging Practice, MIR publishers.
- 3. J.C.Sharman, Drop, Press and Machine Forgings, The machinery publishing co ltd.
- 4. S.K.Hajra Choudhury and A.K.Hajra Choudhury, Elements of Workshop Technology, Media Promoters and publishers pvt. Ltd
- 5. Charles O.Herb, Die-Casting.
- 6. H.H.Doehler, Die-casting.
- 7. H.K and L.C.Barton, Die casting die design
- 8. Ivana Suchy, Hand book of Die Design, McGraw-Hill Book company, Second edition
- 9. A.Thomas, Forging Hand book-forging methods, Drop forging Association, Sheffield
- 10. R.Sharam, S.N.Parsad & N.P.Saxena, Forging Die design and practice, S.Chand & Co
- 11. V.Vladimi Rov, Die, Mould and jig, MIR Publication
- 12. S.E.Rusinoff, Forging and Forming metal, S.Chand & Co
- 13.T.E.Byrer, Forging handbook, American society for metal

22253 - FORGING DIES AND DIE CASTING DIES

MODEL QUESTION PAPER-1

Duration: 3 Hrs

PART-A

Max.marks-75

(Answer any 15 questions) 1. List out various types of impression die forging?

- 2. Why forged parts are preferred over cast parts?
- 3. What is drawing down?
- 4. Define forgeability.
- 5. Write any two limitations of forged parts.
- 6. Why land is provided in drop forging dies?
- 7. Name the material suitable for manufacture of drop forging die
- 8. What is sliding die?
- 9. State any two applications of tin based die casting alloy.
- 10. Name any two applications of cold chamber die casting process
- 11. Name any two alloys suitable for die casting process
- 12. What is the purpose of lubricating the die parts?
- 13. What is the use of overflow in a flow system of die casting dies?
- 14. List the types of ejection systems used in die casting dies
- 15. Write any two characteristics of die steel
- 16. What is meant by blister?
- 17. Define estimation.
- 18. What is the effect of over estimation of die cost?
- 19. What do you mean by die building cost?
- 20. What is design and development cost?

PART-B

(Answer all the questions)

Marks-5x12=60

21A. Write the construction, operation and advantages of induction furnace

(OR)

B. Write short notes on

- Drop forging hammer types (i)
- Roll die forging (ii)

22A. Explain how to design a multi impression die block used in drop forging

(OR)

B. List the various forging defects, their cause and remedial action to avoid the Defects

Marks-15x1=15

23A. Explain the heat transfer in hot chamber die and the methods of controlling die Temperature

(OR)

B. List the various process parameters of die casting machine and explain their effect on product quality

24A. Sketch and explain ring ejections systems used in die casting dies

(OR)

B.Write the probable causes and suitable remedial actions for the following die Casting defects.

- (i) Blisters
- (ii) Cold shut
- (iii) Severe Chill

25A. Explain in detail the sources of error in die cost estimation

(OR)

B. Write the procedure for estimation of final cost of die casting die.

22253 FORGING DIES AND DIE CASTING DIES MODEL QUESTION PAPER-II

Duration: 3 Hrs

Max.marks-75

PART-A

Marks-15x1=15

(Answer any 15 questions)

- 1. What is upsetting?
- 2. Write any two examples of Forged parts.
- 3. List out various types of smith die forging?
- 4. Why forged parts are preferred over cast parts?
- 5. Write any two advantages of forged parts.
- 6. Write any two essential features of forging dies?
- 7. Write any one comparison of hot chamber process and cold chamber process.
- 8. What are the properties of tin base die casting alloy?
- 9. Write any one IS coding for die steel
- 10. State any two applications of zinc based die casting alloy.
- 11. Name any two applications of hot chamber die casting process
- 12. Name any two alloys suitable for die casting process
- 13. List the types of ejection systems used in die casting dies
- 14. Write any defects of die casting die?
- 15. Write any two causes for any one defect of die casting die?
- 16. Write any two remedies for any one defect of die casting die?
- 17. What is the effect of over estimation of die cost?
- 18. What do you mean by die building cost?
- 19. What is trimming of die casting dies?
- 20. Write any two objectives of estimation?

PART-B

(Answer all the questions)

21. A. Explain the various Smith forging operations.

(OR)

- B. Explain the various types of Roll die forging.
- 22. A. Write the step by step procedure for design of dies for forging machines.

(OR)

Marks-5x12=60

- B. Explain the various forging defects with causes and remedies.
- 23. A. Explain the working of a hot chamber die casting machine with a neat sketch.

(OR) B. Explain the melting of Aluminum base alloys and state the properties of aluminum base alloys.

- 24. A. Explain the procedure to calculate the gating dimensions and state its importance. (OR)
 - B. Explain the different characteristics required for die steel, used for die-casting die.
- 25. A. Explain the estimation procedures of an Injection mould.

(OR)

B. Explain the die cost estimation of a press tool.



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22254 - TOOL DESIGN AND DRAWING

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22254
Semester	:	V
Subject Title	:	TOOL DESIGN AND DRAWING

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
			Marks			
SUBJECT	Hours/ Week	Hours/ Semester	Internal Assessment (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
TOOL DESIGN AND DRAWING	6	96	25	75	100	3

Topics and Time allocation

TOPIC	
A. Design of Press Tools and tool drafting technique	45
B. Design of Jigs and Fixtures	25
C. Design of Gauges	20
Revision & Test	6
Total	96

22254 - TOOL DESIGN AND DRAWING

DETAILED SYLLABUS

Contents: Theory

Name of the Topic	Hours
A. DESIGN OF PRESS TOOLS (CUTTING DIES)	
Fourteen steps to design a die.	
Design of - blanking tool push through type ,blanking tool return type, piercing tool, Progressive tool, compound tool. Design of Bending dies - Calculation of – developed length, bending force, spring back. Design of V bending dies, edge bending die, channel bending die.	45
Design of Drawing dies:- Drawing die Design consideration - Calculation of blank diameter, number of draws – Pressure – Clearance – Allowance -Radius of draw dies – Punch radius – Drawing speed and single and double action draw dies – Simple	
Design problems	
DRAFTING TECHNIQUE (Not for examination but should be learnt to draw tool	
drawings - 4 Hours)	
Die layout, details in plan views, details in cross sectional views, clearance, cross	
hatching, dimensioning, detail balloons, title block, stock list, change block and	
equipment block.	
B. DESIGN OF JIGS AND FIXTURES Design of jigs: Principles of locating and clamping - Definition of drill jig - General considerations in the design of drill jigs - Drill bushings - Jig feet - Types of drill jigs - Methods of constructions - Design of solid jigs, leaf jig, plate jig and indexing jig. Design of fixtures: Design of Milling fixtures & lathes fixtures.	25
C. GAUGE DESIGN	
Design of Plain plug gauge as per IS 3455, IS 6137, IS 6244, IS 6246 and IS 7018 : Part 2, Design of snap gauge as per is 3477, Design of plain ring gauges as per IS 3485	20
Revision and Test	06

References:-

- 1. J.R.Paquin, Die design fundamentals, Industrial Press Inc, 1990.
- 2. Donaldson, Tool Design , Tata McGraw-hill Book company, 23rd edition, 2006
- 3. Donald F. Eary., Edward A. Reed, Techniques of Press working sheet metal, Prentice-Hall,Inc.,Second Edition, 1974.
- 4. Indian Standard Specifications IS 3455, IS3484, IS3477 and IS 3485.

INSTRUCTIONS FOR QUESTION PAPER SETTING:

1. Part A is of 10 one mark Questions:- 4 Questions from A

3 Questions from B 3 Questions from C.

- 2. Part B is Tool Design and drawing Question f or 40 marks. Either or Type question is to be asked. One question from A and one question from B. The question asked should be such that it could be answered in 100 minutes time.
- 3. Part C(i) is gauge design and drawing question from C for 15 marks and C(ii) is a design related question from A and B for 10 marks.
- 4. For mark and time allocation please refer the model question paper enclosed herewith.

22254 - TOOL DESIGN AND DRAWING MODEL QUESTION PAPER-I

Note:- 1. Use of Institution copies of approved data books, Indian Standard Specifications permitted.

2. Use Main answer book for writing calculations / theory questions and other design related writing works .

3. The drawings are to be drawn in the given drawing sheet .

Part – A :- Short answer type questions

10 * 1 = 10 marks

- 1. Write the formula for calculation cutting force for blanking operation?
- 2. Write how stripping force in a cutting die is calculated?
- 3. How developed length is calculated in a bending die?
- 4. Write the formula for calculating bending force.
- 5. What type of jig bush is selected for low quantity production?
- 6. What type of locator is suitable of cylindrical components?
- 7. What is the advantage of down milling?
- 8. What type of material is used for plug gauge handles?
- 9. What type of gauge is selected for inspection of external dia of shafts?
- 10. What is IS specification for design of snap gauges?

Part – B :-

40 marks

- 11. Design and draw following views of a progressive tool push through type for the component given in Fig 1.
- 12.a) Sectional elevation b) Plan (Question should be from unit A)

OR

- 13. Design and draw the following views of a suitable jig for drilling four 10mm dia holes on the component given in Fig.2.
 - b) Sectional elevation b) Plan (Question should be from unit B)

Part -C

14. (i) Design and draw a plain plug gauge as per IS 6244 to inspect a hole of dia 50 $\rm H_7.$ - 15 marks

(ii) Explain the important points to be considered while designing a milling fixture. $-\,10\,$ marks

OR

- 15. (i) Design and draw a snap gauge as per IS 3477 to check a shaft of dia 60 p_6 15 marks
 - (ii) Explain the steps involve in the design of edge bending dies. 10 marks

Mark allocation

Part	Detail	Marks allotted	Approximate
			Time allotted for
			answering
А	One mark question	10	20 min
В	Calculations	10	
	Sectional Elevation	15	
	Plan view	10	
	Bill of materials & Dimensioning	05	
	Total for Part B	40	100min
C(i)	Calculations / Selection from IS	05	
	Drawing as per IS	10	
	Total for Part C(i)	15	
C(ii)	Detailed answer	10	
	TOTAL for part C	25	60 min
	TOTAL	75	180 min

Fig 1



Fig 2



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22254 - TOOL DESIGN AND DRAWING MODEL QUESTION PAPER-II

Duration: 3 Hrs

Max.marks-75

Note:- 1. Use of Institution copies of approved data books, Indian Standard Specifications permitted.

2. Use Main answer book for writing calculations / theory questions and other design related writing works .

3. The drawings are to be drawn in the given drawing sheet .

Part – A :- Short answer type questions

- **11.** Write the formula for calculation of die clearance in blanking tool?
- 12. Why stripping force is calculated ?
- 13. What is over bending in 'V' bending tool?
- 14. Write the formula for calculating blank length in u bending?
- **15.** When slip bush is used in jigs?
- 16. What type of locator is suitable of irregular objects?
- **17.** What is the advantage of up milling?
- 18. What type of material is used for plug gauge handles?
- 19. What type of gauge is selected for inspection of length of the components?
- 20. What is IS specification for design of ring gauges?

Part - B :-

40 marks

- Design and draw following views of a progressive tool for the component given in Fig 2.The component is to be made up of cold rolled steel sheet of shear strength 300 N/mm²
 - c) Sectional elevation b) Plan
 - (Question should be from unit A)

OR

- 17. Design and draw the following views of a suitable jig for drilling 6 mm dia holes on the component given in Fig.1. The component is made up of Mild steel.
 - d) Sectional elevation b) Plan (Question should be from unit B)

Part –C

- 18. (i) Design and draw a plain plug gauge as per IS 6244 to inspect a hole of dia 50 $\rm H_7.$ 15 marks
 - (ii) Explain the important points to be considered while designing a welding fixture. $-10 \mbox{ marks}$

OR

- 19. (i) Design and draw a snap gauge as per IS 3477 to check a shaft of dia 85 $p_6 15 \mbox{ marks}$
 - (ii) Explain the steps involved in the design of drawing dies. 10 marks

10 * 1 = 10 marks

. All dimensions are in mm



FIG-2



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22255 - PRESS TOOLS-I PRACTICAL

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22255
Semester	:	V
Subject Title	:	PRESS TOOLS-I PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
SUBJECT Ho	Hours/ Hours/ Week Semester		Marks			
		Internal Assessmen t (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)	
PRESS TOOLS-1 PRACTICAL	6	96	25	75	100	16

Objectives

At the end of the practice, the students will be able to

- Manufacture press tool components as per the given drawing.
- Assemble the components manufactured.
- Set the tools manufactured in the OBI . gap frame press.
- Adjust the shut height, operate the press to take trial production.
- Compare the result with the requirement and to do the necessary corrections if needed.
- To train the students on inspection of presses and tools before tool setting.

DETAILED SYLLABUS

Ex. No.	Name of the exercise	Time in Hours
		18
1.	Manufacture of Blanking Tool – Drop through type	
2.	Manufacture of piercing tool	18
3.	Manufacture of Blanking Tool – Return type	18
4.	Manufacture of Progressive Tool – Drop through type	18
5.	Manufacture or Compound Tool	18
	(a) Testing of OBI / Gap frame presses	
	(i) Parallelism of bolster and ram	
	(ii) Flatness of bolster plate	
	(iii) Squareness of slide motion with bed surface	
6.	(iv) Squareness of shank hole with slide face	
	(b) Testing Pillar die sets	00
	(i) Testing parallelism between top and bottom shoes	06
	(ii) Checking squrareness of bush bore	
	(iii) Checking distance between pillar bores	
	(iv) Checking squareness of assembled pillars	

Note:-

- 1. Batch size should not be more than 5 students for class work.
- 2. For examination, exercise Should be given to students individually and not in batches.
- 3. The examination duration is 16 hours.
- Students should be trained in Press Setting, Tool setting, shut height adjustment, trial production using the tool fabricated by them and rectification of tool defects if any.
- 5. For Board examination any one of the above tool (slno 1 to 5) is to be fabricated, fitted in the press and trial production should be taken. The evaluation of the performance should be based on the component dimensions and finish obtained from the tool fabricated by the student during the 16 hours examination.
- 6. The 6th exercise Press inspection and Tool inspection is compulsory and cannot be counted for 80%.
- 7. In examination, Press / Tool inspection is a compulsory question and should be evaluated for 10 marks.(Please refer the model question paper).

SCHEME OF EXAMINATION:

Manufacture of Tool	-	20marks
Tool finish	-	20 marks
Component finish / accuracy	-	10 marks
Tool setting & trial production	-	10 Marks
Press / Tool inspection	-	10 Marks
Viva Voce	-	05 Marks
Total	-	75 Marks

S.NO	LIST OF THE EQUIPMENTS WITH SPECIFICATIONS	QUANTITY
		REQUIRED
1	Centre Lathe, 4 ¹ / ₂ ' bed length	5
2	Drilling machine	2
3	Shaping machine, stroke length 300mm	2
4	Vertical milling machine	2
5	Surface grinding machine	2
6	Bench vice	10
7	Fitting file set	10
8	Tap set	4
9	Surface plate	2
10	Vernier height gauge 0-250mm	2
11	Dial test indicator with magnetic stand	2
12	Angle plate	2
13	Mechanical power press (15tons- 100 tons)	1


DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22256 - JIGS AND FIXTURES PRACTICAL

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L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22256
Semester	:	V
Subject Title	:	JIGS AND FIXTURES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
SUBJECT	Hours/ Week	Hours/	Marks Internal Board Assessment Examination Total		Total	Duration
	Hook	Comocion	(Marks)	(Marks)	(Marks)	(1110)
Jigs and Fixtures Practical	4	64	25	75	100	16

OBJECTIVES :

- Manufacture of template type drill jig
- Manufacture of Channel drill jig and indexing drill jig
- Manufacture of milling fixture
- Manufacture of inspection fixture
- Manufacture of welding fixture
- Use different machine tool in Manufacture of jigs and fixtures.

A. Manufacture of following Jigs

- 1. Template drill jig
- 2. Channel drill jig
- 3. Indexing drill jig

B. Manufacture of following Fixtures

- 4. Milling Fixture
- 5. Inspection Fixture
- 6. Welding Fixture

Note:-

- 21. Batch size should not be more than 5 students for class work.
- 2. For examination, exercise Should be given to students individually and not in batches.
- 3. The examination duration is 16 hours.
- 4. Students should be trained in setting the Jig/Fixture on the machine tool, to make necessary adjustments, trial production using the tool fabricated by them and rectification of tool defects if any.
- 5. For Board examination any one of the above tool (slno 1 to 6) is to be manufactured, fitted in the machine tool and trial production should be taken. The evaluation of the performance should be based on the component dimensions and finish obtained from the Jig / Fixture manufactured by the student during the 16 hours examination.

SCHEME OF EXAMINATION:

Manufacture of Jig / Fixture	-	25marks
Tool finish	-	25 marks
Component finish / accuracy	-	10 marks
Tool setting & trial production	-	10 Marks
Viva Voce	-	05 Marks
Total	-	75 Marks

DETAILS OF THE EQUIPMENTS

NAME OF THE BRANCH / COURSE	MECHANICAL ENGINEERING		
	(TOOL & DIE)		
YEAR	THIRD		
SEMESTER	V		
NAME OF THE LABORATORY	22256 JIGS & FIXTURES PRACTICAL		

S.NO	LIST OF THE EQUIPMENTS WITH SPECICATIONS	QUANTITY REQUIRED
1	Centre Lathe, 4 ¹ / ₂ ' bed length	5
2	Drilling machine	2
3	Shaping machine, stroke length 300mm	2
4	Vertical milling machine	2
5	Surface grinding machine	2
6	Bench vice	10
7	Fitting file set	10
8	Tap sets	4
9	Surface plate	2
10	Vernier height gauge 0-250mm	2
11	Dial test indicator with magnetic stand	2
12	Angle plate	2



DIPLOMA IN ENGINEERING/TECHNOLOGY

L - SCHEME 2011 - 2012

COMMUNICATION AND LIFE SKILLS PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

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L-SCHEME (Implemented from the Academic year 2011-2012 onwards)

Course Name : DIPLOMA IN ENGINEERING/TECHNOLOGY

Subject Code : 20002

Semester : IV or V SEMESTER

Subject Title : COMMUNICATION AND LIFE SKILLS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

	-					
Subject Title	Instructions		Examination			
			Marks			
	Hours/ Week	Semester	Internal assessment	Board Examination	Total	Duration
COMMUNICATION AND LIFE SKILLS PRACTICAL	4 Hours	64 Hours	25	75	100	3 Hours

No. of Weeks per Semester: 16 Weeks

Topics and Allocation of Hours:

SI. No.	Section	No. of Hours		
1	Part-A:Monodic Communication	16		
2	Part-B:Dyadic Communication	16		
3	Part-C:Professional Communication	16		
4	4 Part-D:Life Skills			
	64			

RATIONALE

Nowadays, effective and errorfree communication is a basic need. Communication through English is the order of the day for entry and survival in any corporate. Training in Monodic communication (one man communication) Dyadic communication (a pair communication) and Professional communication (may be Monodic, Dyadic or Group communication) is attempted through these practical modules. One can improve one's communication skills by enriching one's vocabulary ,particularly active vocabulary and standard everyday expressions and using them in various contexts. Practice alone, both on the campus and outside the campus, can help a learner to grow proficient in the art of Communication.

Language is the most commonly used and effective medium of self-expression in all spheres of human life - personal, social and professional. A student must have a fair knowledge of English language use and various communicative functions. He/she must be able to pursue the present course of study and handle the future jobs in industry. The objective of the course is to assist the diploma holders to acquire proficiency in monodic, dyadic and professional communication skills and selective but most important life skills. At the end of the course, the student will be able to communicate his ideas fearfree and errorfree, in social and professional spheres of life and imbibe life skills.

SPECIFIC INSTRUCTIONAL OBJECTIVES

Communication is crucial as it influences every aspect of one's personal development. Having a sound grounding in reading and writing techniques allows a student to progress on to higher level literacy skills. Many students struggle because their basic decoding is so inaccurate that advanced comprehension is difficult for them. Because of their poor exposure and poor use of English language in various spheres of life they suffer proper communication. They also tend to be 'afraid' of words and in turn they are not able to develop their personal vocabulary. In otherwords, without solid literacy skills, the student's prospects and life chances are limited. It is a fact that Communication skills and Life Skills shapes one's personality.

MONODIC COMMUNICATION

The student is able to:

- 1. Practise using departmental words and terminology in sentences.
- 2. Prepare and perform oral presentations.
- 3. Introduce oneself and others.
- 4. Deliver welcome address and vote of thanks.
- 5. Compere a program.
- 6. Describe the visuals.
- 7. Take notes, answer very short questions.
- 8. Comprehend an auditory/oral passage.

DYADIC COMMUNICATION

The student is able to:

- 1. Adopt various communicative functions.
- 2. Prepare and perform a dialogue.
- 3. Adopt the basics of telephone etiquette.

PROFESSIONAL COMMUNICAITON

The student is able to:

- 1. Prepare a resume.
- 2. Take part in a group discussion.
- 3. Communicate through body language.
- 4. Adopt the interview skills with professional presence.
- 5. Perform mock interview.

LIFE SKILLS

The student is able to:

- 1. Prepare for and deal with change.
- 2. Adopt motivation, goal-setting and self-esteem.
- 3. Adopt Teamwork skills.
- 4. Adopt Time management.
- 5. Adopt Emotional intelligence skills.
- 6. Assert Positively.
- 7. Adopt Interview etiquette.
- 8. Plan career.
- 9. Understand Strength, weakness (long term, short term).

LEARNING STRUCTURE

To enable the students to practise monodic communication, dyadic communication professional communication and imbibe life skills through various modes of practical learning and assignments.

PROCEDURE	MONODIC COMMUNICATION	DYADIC COMMUNICATION	PROFESSIONAL COMMUNICATION	LIFE SKILLS
PRINCIPLES	Identifying various platforms	Exposure to dialogue situations, exposure to telephone etiquette.	Exposure to resume writing, group discussion, interviews.	Exposure to selective life skills/problem solving skills.
CONCEPTS	Sharing opinions, feeling, with or without audience.	Understanding the basic communicative functions. Conversing with a neighbour	Writing resume, performing group discussion, facing interviews.	Imbibe and practise the selective life skills.
FACTS	Oral presentation, art of introduction, enhancing the list of active vocabulary, listening skills, note taking skills, describing skills.	Audio tapes, compact disk, mikes, various contexts.	FAQ, Resume models, Audio tapes, compact disk, mikes.	Stories, anecdotes, incidences, case studies and assignments.

COMMUNICATION AND LIFE SKILLS PRACTICAL

SYLLABUS

PART A: MONODIC COMMUNICATION

(16 hours/ periods)

- a) Vocabulary enrichment: recording important words and terminology alphabetically connected to the concerned department playing antakshari.
- **b) Introducing oneself**: using greeting phrases opening and closing with courteous notes supplying personal information.
- c) Introducing others: using greeting phrases opening and closing with courteous notes with information.
- d) Welcome address, vote of thanks and compering a program: keeping notes and personal information of the dignitaries concerned.
- e) Making an Oral Presentation: Preparing the presentation Talking about people, animals and places – Keywords technique and the rehearsal – Presentation outline – Performing the presentation – answering the questions.
- **f)** Oral description: a picture from an English magazine a visual ad a natural scene.
- **g)** Auditory/Oral comprehension small passage small dialogue -very short story note taking skill.
- h) News Caption: giving caption for a news item from an English daily.

PART B: DYADIC COMMUNICATION: COMMUNICATIVE FUNCTIONS (16 hours/ periods)

- a) **Dialogue**: preparing and performing Meeting people, exchanging greetings and taking leave Giving instructions and seeking clarifications Thanking someone and responding to thanks minimum seven exchanges including the courteous openings and closings ten common contexts.
- b) Telephonic dialogue: telephonic etiquette Answering the telephone and asking for someone – Dealing with a wrong number – Taking and leaving messages – Making enquiries on the phone-ordering for supply-bookings and arrangements-handling the complaints – calling for appointment.

PART C: PROFESSIONAL COMMUNICATION

(16 hours/ periods)

- a) Group Discussion Taking part in a Group Discussion focus on team spirit.
- b) Interview Frequently asked questions in an interview Mock interview Body language.
- c) Resume Writing components.

PART D: LIFE SKILLS

- **a)** Preparing for and dealing with change.
- b) Motivation, goal-setting and self-esteem.
- c) Teamwork skills.
- d) Time management
- e) Emotional intelligence skills
- f) Career planning.
- g) Assertive Skills.
- h) Interview skills.

(16 hours/ periods)

References :-

- 1) Malcolm Goodale, Professional Presentations with VCD, Cambridge University Press
- 2) B.Jean Naterop and Rod Revell, Telephoning in English with 2 Audio CDs Cambridge University Press
- 3) Priyadarshi Patnaik, Group Discussion and Interview Skills with VCD, Cambridge University Press
- 4) Kamalesh Sadanand and Susheela Punitha, Spoken English: A Foundation Course for Speakers of Tamil, Orient BlackSwan.
- 5) S. P. Dhanavel, English and Soft Skills, Orient BlackSwan
- 6) Robert Sherfield and et al, Developing Soft Skills, Pearson Education.
- 7) Poly Skills: A course in communication skills and Life skills, Cambridge University Press.
- 8) English and Communication Skills for Students of science and Engineering by S.P.Dhanavel , Orient BlackSwan.
- 9) Speak Well, edited by Kandula Nirupa Rani, Jayashree and Indira, OrientBlackSwan.
- 10) Fifty ways to improve your telephoning and teleconferencing Skills by Ken Taylor -

COMMUNICATION AND LIFE SKILLS PRACTICAL Model Question Paper - 1

PART – A (35 Marks)

Max Marks: 75

Mo	onodic Communication:	
1.	Introduce one self	

Time: 3 hrs

(5)

- 2. Use the mentioned words orally in sentence $(2x2 \frac{1}{2} = 5)$
- 3. Prepare and present a welcome address for your college annual day programme. (5)
- Listen to the passage read out from the English daily of the week of the examination. Please note: No prerecorded passage (10)
- 5. Write a news caption for the passage given from the English daily. (5)
- a) Describe orally the visual or the picture found in the English daily of the week of the examination.
 (5)

(Or)

b) Make an oral presentation about an animal.

PART – B (15 Marks)

Dyadic Communication:

- 1. Play antakshari of five pairs of departmental words with your partner. (5)
- 2. Prepare and perform a dialogue with your partner on the given situation (10)

(minimum seven exchanges)

Or

Prepare and perform a telephonic dialogue on a flight booking.

(minimum seven exchanges)

PART-C (25 Marks)

Professional Communication:

1. Form a group of six members and perform a discussion on the given theme. (10)

2.Imagine you are V.Gokulraj ,a diploma holder. Prepare a resume for the post of supervisor in Oberoi computers Ltd.Chennai. (10)

Professional appearance: Interview etiquette-dress code- Body language (5)

COMMUNICATION AND LIFE SKILLS PRACTICAL Model Question Paper - 2

Time: 3 hrs

PART – A (35 Marks)

Max Marks: 75

Monodic Communication:

- 1. Introduce your friend S.Mohan an a excutive engineer to a group of audience. (5)
- 2. Use the mentioned words in sentence orally. $(2x2 \frac{1}{2} = 5)$
- 3. Prepare and present a Vote of thanks in your college sports day programme. (5)
- 4. Listen to the passage read out from the English daily of the week of the examination.Please note: No prerecorded passage (10)
- 5. Write a news caption for the passage given from the English daily. (5)
- a) Describe the visual or the picture found in the English daily of the week of the conduct of the examination.

(Or)

b) Make an oral presentation about your polytechnic college.

PART – B (15 Marks)

Dyadic Communication:

- 1. Play antakshari of five pairs of your departmental words with your partner. (5)
- 2. Prepare and perform a dialogue with your partner on the given situation (10) (minimum seven exchanges)

(Or)

Prepare and perform a telephonic dialogue on ordering the supply of a computer (minimum seven exchanges)

PART-C (25 Marks)

Professional Communication:

1.Form a group of six members and perform a discussion on the given theme (10)

Imagine you are M.Kishore a diploma holder. Prepare a resume for the post of operating engineer in REC Electricals Ltd.Madurai. (10)
 Professional appearance: Interview etiquette-dress code- Body language (5)

NOTES OF GUIDANCE

Role of the media:

To equip a learner with vocabulary, particularly active vocabulary and standard everyday expressions ,using English dailies and watching selective English T.V. channels both in the classroom and outside the classroom is focused. Such a provision is recommended for the students to establish familiarity with the English dailies and selective English T.V. channels. Minimum two copies of two English dailies in the laboratory room (students can bring their own copies also). Minimum two systems with net connection for information collection in the laboratory itself.

Synopsis of the news item:

During every lab work day, students must choose a news item from the English daily or weekly or monthly, and write a synopsis of the chosen news item, in not more than five lines. The news item should be pasted on the left page and synopsis on the right page (the chosen news item should not be politically, socially or communally controversial). Students should exercise care in choosing the news items. Teachers have to advise them on this aspect. This can be done outside the class hours also but every record exercise should begin with the synopsis of news item of the date of the lab session.

For example, first lab exercise namely departmental vocabulary and antakshari is performed on 15/12/2011. The student should choose a news item from any English daily of 15/10/2011 and record the synopsis on the right page (in not more than 5 lines) under the caption **Synopsis of the news item of the day/date 15/10/2011.**There is no harm in repeating or copying the lines form the passage. The essence of the passage should be there. The cutout news item for presenting the synopsis should be pasted on the left page of the record notebook.

This is to be done with interest for developing one's personality. This work **does not carry any marks** but without which the record exercise should not be valued. This is the precondition for valuing the record exercise. Each record exercise follows the synopsis of the chosen news item.

At the bottom of the synopsis, the student should record the **dictionary meaning** of atleast **one strange word** found in the chosen news item. At the end of every month, a minimum of 10 Headlines of 10 different days i.e. one Headline a day from anyone English daily should be pasted on the right or left page of the Record Note Book. (This work does not carry marks but this is the precondition for marking the record exercises)

External examiner, before signing the record notebook, should verify whether the Newspaper works were recorded/pasted in the record notebook.

Verbal communication in any language begins with sounds in isolation, union and word formation. Learning everyday words and expressions is the primary factor. Grammar comes next. One can enrich one's every day vocabulary by reading English magazines and listening to or watching an English channel on television. So an English laboratory should be equipped with a minimum of two copies of two English dailies and English weeklies or monthlies.

Watching English channels helps the students improve their vocabulary and expressions. If there is a provision, students may be permitted to watch selective, mind corruption free English channels (sports, education, news, animal channels and so on) for

at least 15 min. during the English lab sessions. This will serve as motivation for the students and help them shed their inhibition.

What is antakshari? (Polar word game)

This game can be played on the stage by two or three students using the departmental words. Suppose Mr. A belongs to Dept.of Electrical and Electronics and he says his departmental word ' **ampere** 'Mr. B has to supply a word beginning with the ending letter of Mr. A's word. The word **ampere** ends with the letter ' e' so Mr. B says ' **electrical** '.Mr. A has to continue with the letter ' I '. Like that five pairs of words are to be spoken.(Letter ending only, not sound ending.) Suppose departmental words are not available in some English letters like

'x''y''z' the students may be permitted to use common words.

ANTAKASHARI (Five Exchanges) (Dept. of Mechanical Engineering.)

EXAMPLE:

1. Governor

Mr. A

- 2. **R**ac**k**
- 3. Nut
- 4. Lathe
- 5. Naphtha

Mr. B Reservoir Kelvin Tool Emission Anvil

Introducing oneself:

One is not expected to introduce one's family. One or two sentences on his family will do. Care must be taken to include general proficiency, titles and merits, awards possessing or secured in academic activities like paper presentation, participation in inter polytechnic or intra polytechnic competitions, sports activity, forums like NCC,NSS, hobby, ambition, strengths and weaknesses.

Introducing others - merits - credentials—one or two points on his family.

Vote of thanks / Welcome address.No doubt it should be all-covering but Focus should be on the important persons/invitees/chief guest and the message of the speaker.

Description (pictures from English weekly/daily) Pictures may be displayed through projector or Magazine cuttings may be used. Just five lines on the picture will do.

Auditory/oral comprehension: A Passage from any English daily of the week of the examination is to be read out for two to three minutes in the end examination. Display of recorded passages can be used as an addition in the class room. The use of pre-recorded passage discouraged in the end examination.

Oral presentation: Students must be encouraged to use English magazines and internet for collecting information on the topic, noting keywords and use them in their presentation in his own language. One must be able to talk extempore for 2 min on any topic, given a time of two minutes for organizing his/her thoughts. The topics can be kept simple and general (current events of interest like sporting event for headline of the day). It must be totally an oral activity without the aid of any other media.

News Caption: A news item ,without heading,of not more than ten lines from an English daily of the week of the conduct of Examination is to be given. The caption may be a passive construction or a catchy phrase on the given news item.

Face to face dialogue: Selective nine situations / topics are to be performed in the class room. (Minimum seven exchanges with courteous openings and closings).

Telephonic dialogue: Selective seven situations to be given. (Minimum seven exchanges).

Resume writing: cover letter—the components of a resume like sender's address, recipient's address, career objective to be explained.

Group Discussion: Topics of common interest, avoiding controversial ones, are to be given for discussion. A group may consist of six members.

Students should be exposed to 44 phonemes (sounds) in English language and their symbols.

There shall be no question on this end examination.

COMMUNICATION SKILLS EXERCISES:-

- 1. Departmental Vocabulary alphabetically (using it in sentence, antakshari). Using the words orally in sentences
- 2. Introducing oneself and others
- 3. Vote of thanks / Welcome address
- 4. Description (pictures from English weekly/daily)
- 5. Auditory/oral comprehension
- 6. Oral presentation
- 7. Face to face dialogue
- 8. Telephonic dialogue
- 9. Resume writing
- 10. Group Discussion

Communication Skills:

Ten Marks for each exercise leading to a maximum of hundred marks in total.

The total marks to be reduced to an average of ten marks.

Texts of the performed activities to be recorded in the Record Note book. Synopsis of the news item of the day/date is mandatory at the beginning of every record exercise.

Life Skills:

- i) Preparing for and dealing with change.
- j) Motivation, goal-setting and self-esteem.
- k) Teamwork skills.
- I) Time management
- m) Emotional intelligence skills
- n) Career planning.
- o) Assertive Skills.
- **p)** Interview skills.

Life skills are to be intensely inculcated through lectures, quotes, anecdotes and case studies. An excellent awareness of the eight essential life skills is to be created through continuous internal assessment. Five assignments in these topics are to be recorded in the record note book.

- > A minimum of five assignments on five different topics.
- > Each assignment to be assessed for twenty marks.
- > The total marks to be reduced to an average of ten marks.
- > All the topics to be covered in the lab.

TIME MANAGEMENT IN THE END EXAM.

For written part 30 min

• Written part of the examination should be the first / beginning of the examination,

monadic oral exam to start during the written exam.

Written Part exercises:

- auditory / oral comprehension.
- Resume writing.
- Giving news caption for the passage.
- During the written examination time of 30 minutes, monodic communication examination may also take place simultaneously.

MONODIC COMMUNICATION (ONE MAN COMMUNICATION)

Oral part – 75 min.

Both internal and external examiners (simultaneously) are to examine the students. Five minutes for each student. 15 students for external & 15 students for internal and within 75 minutes both internal and external examiners complete the monadic communication exam.

DYADIC COMMUNICATION (ONE PAIR COMMUNICATION)

- 5 min for each pair.
- 15 pairs in total. 8 pairs for external and 7 pairs for internal examiner. (8x5=40 min) within 40 min both internal and external examiners completes the dyadic communication exam.
- The students examined by the external for monadic exam are to be examined by the internal for dyadic and vice versa.

PROFESSIONAL COMMUNICATION

- 30 min for group discussion.
- 6 members in each group.
- 5 min for discussion for each group.
- Both internal and external examiners to supervise / examine simultaneously one group each.
- Within fifteen minutes all the six groups to be examined.

LABORATORY REQUIREMENT

- 1. An echo-free room for housing a minimum of sixty students.
- 2. Necessary furniture and comfortable chairs
- 3. Public Address System.
- 4. A minimum of two Computers with internet access, with Audio for Listening Skill and related software packages.
- 5. A minimum of Two different English dailies.
- 6. A minimum of one standard Tamil daily.
- 7. Headphone units 30 Nos. with one control unit with a facility to play and record in Computer.
- 8. A minimum of Three Mikes with and without cords.
- 9. Colour Television (minimum size 29").
- 10. DVD/VCD Player with Home Theatre speakers.
- 11. Clip Chart, white board ,smart board.
- 12. Projector.
- 13. video camera.
- 14. Printer, Xerox, scanner machines desirable.
- 15. English Weeklies/monthlies/journals like ELTOI desirable.
- 16. Frozen thoughts -monthly journal for Lifeskills by Mr.Rangarajan / www.frozenthoughts.com

Mark Pattern

End Examination –75 MarksMonodic Communication –35 MarksDyadic Communication –15 MarksProfession Communication –20 MarksProfessional Appearance –5 Marks

Internal Assessment	25 Marks
Communication skills Record Notebook	10 Marks
Life skills assignments	10 Marks
Attendance	5 Marks

COMMUNICATION AND LIFE SKILLS PRACTICAL

Allocation & Statement of Marks

Duration:3Hrs.

Name of the Candidate

Reg. No.

A. Monodic communication : 35 Marks

Introduction (5 mks)	Use in sentence (5 mks)	Vote of thanks / welcome address (5 mks)	Auditory/Oral comprehension (10 mks)	Description/ Oral presentation (5 mks)	News caption (5 mks)	Total (35 mks)

B. Dyadic communication: 15 Marks

Antakshari	Dialogue	Total
(5 mks)	(10 mks)	(15 mks)

C. Professional communication: 20 Marks

Group Discussion	Resume	Total
(10 mks)	(10 mks)	(20 mks)

D. Internal Assessment: 25 Marks

Record Notebook Commn.skills (10 mks)	Assignments Life Skills (10 mks)	Attendance (5 mks)	Total (25 mks)

E. Professional Appearance:

/5 Marks

100 Marks

Total :

Internal examiner

External examiner

FACE TO FACE DIALOGUE TOPICS

- 1. Between Friends (On any acceptable topic).
- 2. Between a conductor and a passenger.
- 3. Between a doctor and a patient.
- 4. Between a Shopkeeper and a Buyer.
- 5. Between a Teacher and a Student.
- 6. Between a tourist and a guide.
- 7. In a Bank.
- 8 At a railway enquiry counter.
- 9. Lodging a complaint.

Note: A resourceful teacher may add a few more topics of common interest.

TELEPHONIC DIALOGUE TOPICS

- 1. Placing an order.
- 2. Making Enquiries.
- 3. Fixing appointments
- 4. Making a hotel reservation.
- 5. Dealing with a wrong number.
- 6. Travel arrangements.
- 7. Handling complaints.

MECHANICAL DEPARTMENTAL VOCABULARY FOR ANTAKASHARI AND USING IN SENTENCES

EXAMPLE:

A:

- 1. Anvil made of cast Iron used in foundry shop.
- 2. Axle A metal rod that connects two wheels.
- 3. Alloy alloy is a mixture of two or more metals.
- 4. Addendum distance between top of gear teeth and pitch circle.
- 5. Annealing It is a heat treatment process for softening the metals.

B:

- 1. Bearing it is which supports the shaft.
- 2. Bolt it is a type of fastener. Combined with screw.
- 3. Brake it is used to halt an auto mobile vehicle.
- 4. Beed steel wiring used in tyres to withstand stress.
- 5. Baffles it is used to reduce noise, filter dust particles in auto mobile.

C:

- 1. Cam it is a lobe like structure, which actuates the valve.
- 2. Crown the slope like structure in the piston.
- 3. Calipers' they are measuring instruments.
- 4. Clutch it is used to disengage and engage the fly wheel and main shaft.
- 5. Chamber it is the distance between vertical line and tyre center line.

D:

- 1. Damper it is a type of shock absorber, reduces the vibration.
- 2. Differential it controls the speed of rotating wheel in the rear axis.
- 3. Diaphram it is used to separate two layers.
- 4. Detonation it is the continuous knocking with serious effect on cylinder head.

E:

- 1. Evaporator it absorbs heat to vapourise liquid into air
- 2. Engine-the place where fuel is burnt and heat energy is converted. mechanical energy
- 3. Electrolyte-it is a liquid substance which is used to transfer current or any metal particle.
- 4. Emission-the release of burnt gas from automobile.
- 5. Elongation-the increase of dimension due to application of load.

F:

- 1. Filter-which is used to remove dust particles.
- 2. Friction-the resistance on wear occur due to rubbing of two metals.
- 3. Fly wheel-the wheel like structure used to balance the uneven weight in engine.
- 4. Fuel it is a substance that burns with oxygen in the air.
- 5. Factor of safety it is the safety limit after which the material will break down.

- G:
- 1. Governor it is used to control the flow of fuel according to load.
- 2. Gear it is used to transmit power from one place to another.
- 3. Generator it is used to generate power.
- 4. Gasket it prevents the leakage and to provide sealing effect.
- 5. Goggle the protective device used to guard the eyes.

H:

- 1. Hub it is the center part of wheel.
- 2. Hammer it is used to beat sheet metals.
- 3. Hydraulics it deals with fluid for various function.
- 4. Hatching it is used to highlight the parts in drawings.
- 5. Head stock it is the main function unit of lathe.

I:

- 1. Ignition it is the function by which fuel is burnt.
- 2. Injection it is the process of spraying fuel into engine block.
- 3. Impeller it is which converts kinetic energy into pressure energy.
- 4. Inventory it is the place where raw materials are stored.
- 5. Idling it is the condition at which the automobile engine at stationary state.

J:

- 1. Jig it guides the tool and hold the job.
- 2. Jaw it is teeth like structure used to hold work pieces.
- 3. Jog mode Jog mode is used to give manual feed for each axis continuously.
- 4. Junk it is known as waste material in industry.
- 5. Journal It is a type of bearing.

K:

- 1. Keyway it is a specific path made in shaft to joint parts.
- 2. Knocking the sound produced due to Burning of uncompleted burnt fuel.
- 3. Kelvin it is the degree of hotness.
- 4. Knurling it is the process of lathe done to work piece to improve the gripness.
- 5. Knuckle joint It is a type of joint used to connect two work pieces.

L:

- 1. Lubrication process of reducing heat by applying cooling substances.
- 2. Layering it is used to draw parts of a machine separately and combine together.
- 3. Lever it is a supported arm used to engage gears.
- 4. Lathe it is the father of machines used in turning operations.
- 5. Lead screw it is the screw through which the carriage travels.

M:

- 1. Manometer it is used to measure the pressure of fluids.
- 2. Milling process of removing metal from work piece by rotating cutting tool.
- 3. Manifold it is a passage made for flow of fuel in automobile.
- 4. Moulding it is the process of passing hot liquid metal into mould made through sand.
- 5. Module it is a metric standard used to identify or specify pitch.

N:

- 1. Nozzle it is used to reduce the pressure and increases the velocity.
- 2. Nut it is a type of fastener used to couple with screw.
- 3. Nomenclature Dimensional property of specific part on component is notified by nomenclature.
- 4. Neck Distance between drills body and shank.
- 5. Naphtha kind of inflammable oil.

O:

- 1. Orthography it is the three dimensional view of an object.
- 2. Ovality Elliptical shape of piston.
- 3. Over haul it is the complete checking and servicing of a machine or vehicle.
- 4. Optimum temperature suitable temperature condition for certain process on working.
- 5. Offset it is by which the axis of certain job is defined.

P:

- 1. Pinion a small gear is called pinion.
- 2. Pulley A cylindrical object used to connect belt for transmitting power.
- 3. Pump it is which transfers fluid from one place to another.
- 4. Piston it is which transfer power from combustion chamber to connecting rod.
- 5. Port it is the opening in two stroke engine for movement of fuel and exhaust.

Q:

- 1. Quilt it is used to give automatic feed in machines.
- 2. Quality control it is an inspection processl.

R:

- 1. Reaming it is the operation used to finish inner surface of a hole.
- 2. Reservoir it is used to store fuel or any liquid.
- 3. Rack it is a spur gear with infinite radius.
- 4. Retainer it is used to bring back to the original position.
- 5. Radiator it is the part used in automobile for cooling water.

S:

- 1. Shackle it is a rod connected to leaf spring.
- 2. Spring it is a circular rod which compresses on load and retracts when released.
- 3. Strainer it is used to remove micro particles.

- 4. Shock absorber it is used to reduce vibration and give cushioning effect.
- 5. Suspension- it is used to absorb shocks and give cushioning effect.

T:

- 1. Tail stock it is used in lathe to support the job.
- 2. Tool it is a metal.removal device.
- 3. Torque it is the twisting load given on a work piece.
- 4. Trimming it s the process of removing excess metal .
- 5. Turning it is a metal cutting process used to reduce diameter.

U:

- 1. Universal joint-it is used to connect propeller shaft and differential unit.
- 2. Universal divider head- it is used to index various components.

V:

- 1. Valve valve is the part used in automobile for flow of fuel and exhaust to cylinder head.
- 2. Vent hole it is the hole made in casting for ventilation purpose.
- 3. Vulcanizing it is the process of adding carbon to rubber.
- 4. Vibration it is caused due to the movement in an uneven surface.
- 5. Velocity-rate of change of displacement.

W:

- 1. Wheel-it is a circular object which rotates and moves the vehicle.
- 2. Wiper-it is used in wind shield to remove water droplets.
- 3. Work piece-it is the material in which various processes are done to make a component.
- 4. Wage-it is the amount paid to a worker for his work.
- 5. Washer-washer is a component used in fasteners to reduce gap.

Y:

- 1. Yawing-the turning of wind mill towards direction of air is called yawing.
- 2. Yoke-it is which holds the other end of spindle in milling machine.
- 3. Yield stress-It is the stress above which it will attain the breaking stress.
- 4. Young's modulus-it is the ratio between stress and strain.

Pl.note: Suppose departmental words are not available in some English letters like 'x ' y ' z ' the students may be permitted to use common words. This is only an example. Another student of Mechanical Engineering can have different sets of words under each letter of the English alphabet.Like that there may be variety of sets. The most important point is that One is not supposed to murmur but speak the words intelligibly in an audible manner. Swallowing the words will deprive a student of winning a selection in an interview. In the same way, students of other Departments can have different sets of words of their departments under each letter of the English alphabet.

TELEPHONE LANGUAGE AND PHRASES IN ENGLISH

Answering the phone

- " Good morning/afternoon/evening, Madras Enterprises, Premila speaking."
- " Who's calling, please?"

Introducing yourself

- " This is Raghavan speaking."
- " Hello, this is Raghavan from Speak International."

Asking for someone

- " Could I speak to Mr. Raman, please?"
- " I'd like to speak to Mr Raman, please."
- " Could you put me through to Mr Raman, please?"
- " Could I speak to someone who ..."

Explaining

- " I'm afraid Mr. Raman isn't in at the moment".
- " I'm sorry, he's in a meeting at the moment."
- " I'm afraid he's on another line at the moment."
- " Putting someone on hold"
- " Just a moment, please."
- " Could you hold the line, please?"
- " Hold the line, please."

Problems

- " I'm sorry, I don't understand. Could you repeat that, please?"
- " I'm sorry, I can't hear you very well. Could you speak up a little, please?"
- " I'm afraid you've got the wrong number."
- " I've tried to get through several times but it's always engaged."
- " Could you spell that, please?"

Putting someone through

- " One moment, please. I'll see if Mr Raman is available."
- " I'll put you through."
- " I'll connect you."
- " I'm connecting you now".

Taking a message

- " Can I take a message?"
- " Would you like to leave a message?"
- " Can I give him/her a message?"
- " I'll tell Mr. Raman that you called"
- " I'll ask him/her to call you as soon as possible."
- " Could you please leave your number? I shall ask him to get back to you."

Pl.note: The above ones are samples only. A resourceful teacher may add more.

DAY-TO-DAY EXPRESSIONS (For dialogues)

COMMON PARLANCE

How are you? Fine. Thank you. How are you? Me too. How do you do? How do you do? It's good to see you again. Glad to meet you. Thank you. Thanks very much. Welcome.

Hello! How is everything? Just fine. Thanks. What's new? Nothing much.

I'm pleased to meet you. The pleasure is mine. I've heard Paul speak about you often. Only good things! I hope.

Look who's here! Are you surprised to see me? Sure. I thought you were in Chennai. I was, but I got back yesterday. Sorry, May I help you? So kind of you. That's so nice of you. Nice talking to you. Nice meeting you. It's getting late, and I've to go now. Certainly. Come back soon. In that case, I'll be seeing you. Fine. Thank you. Welcome So long. See you later. Take care. Bye. Good-bye.

Could you tell me the time, please?

Certainly. It is 5.35 p.m.

My watch says 5.40 p.m.

Then your watch is five minutes fast.

Excuse me. Can you tell me the way to ...?May I come in?How is the weather today?It is pleasant. / sunny / rainy / warm /windy.

I am sorry, Can you repeat what you have said. I am sorry, I can't hear you properly. It is not audible. Can you please repeat it? Beg your pardon; I don't get your words clearly. How do you feel now? Are you ok? I am fine. And how about you? I am fine. Thank you.

GROUP DISCUSSION

Let me begin with introducing this concept, Well, this is to convey that At the outset, I am here to convey At this juncture, I would like to May I intervene? May I add? Kindly permit me to say If you could allow me to say Let me add a few words Let me first answer your question Can you please allow me to convey Excuse me; I would like to add further

On behalf of my colleagues, On their behalf Firstly/ secondly/ thirdly. Finally/ conclusively/ at the end / Summing up Eventually/ in the event of In spite of / otherwise/ although/ though

Please Note:

- The above ones are samples only.
- A resourceful teacher may add more.
- A potential student may exhibit variety.





DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22061- INDUSTRIAL ENGINEERING AND MANAGEMENT

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22061
Semester	:	VI
Subject Title	:	INDUSTRIAL ENGINEERING AND MANAGEMENT

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instru	uctions	Examination			
Industrial	Hours/ Week	Hours/ Semester	Marks			Duration
Engineering and Management	5 80	80	Internal Assessment	Board Examinatio n	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No	Topics	Hours
I	PLANT ENGINEERING AND PLANT SAFETY	15
II	WORK STUDY, METHOD STUDY AND WORK MEASUREMENT	15
ш	PRODUCTION PLANNING AND QUALITY CONTROL	15
IV	PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT	15
V	FINANCIAL MANAGEMENT AND MATERIALS MANAGEMENT	15
	REVISION AND TEST	5
	Total	80

RATIONALE:

In the Indian Economy, Industries and enterprises always find prominent place. After globalization, the government of India has announced liberalization policy of starting an enterprise which resulted in the mushroom growth of industries. The present day students should be trained not only in manufacturing processes but also in managing activities of industries. Training must be imparted to students not only to shape them as technicians but also as good managers.

The knowledge about plant, safety, work study techniques, personnel management and financial management will definitely mould the students as managers to suit the industries. Due to the presence of such personalities the industries will leap for better prosperity and development.

OBJECTIVES:

- Explain the different types of layout and compare them.
- Appreciate the safety aspects and its impacts on an organization.
- Compare different productivity improvement technique.
- Explain different work measurement techniques.
- Estimate standard time for a job.
- Explain production planning and control and its functions.
- Study the role of PPC as a tool for cost control.
- Prepare process control charts.
- Explain the principles of management and function of management.
- Compare different organizational structure.
- Explain the selection and training of staff.
- Analyse inventory control system and the tools used in stock control.
- Explain the procurement and consumption cycle.

22061 - INDUSTRIAL ENGINEERING AND MANAGEMENT DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	PLANT ENGINEERING AND PLANT SAFETY	15 Hrs
	Plant Engineering : Plant – Selection of site of industry – Plant layout –	
	Principles of a good layout – types – process, product and fixed position –	
	– Plant maintenance – importance – Break down maintenance	
	preventive maintenance and scheduled maintenance.	
	Plant Safety: Importance -accident-causes and cost of an accident-	
	accident proneness-prevention of accidents-Industrial disputes-settlement	
	of Industrial disputes-Collective bargaining, conciliation, Mediation,	
	arbitration-Indian Factories Act 1948 and its provisions related to health, welfare and safety	
	wenale and salety.	
II	WORK STUDY, METHOD STUDY AND WORK MEASUREMENT	15 Hrs
	Work Study: Productivity - Standard of living - method of improving	
	productivity – Objectives – Importance of good working conditions.	
	Method Study: Definition – Objectives – Selection of a job for method	
	Operation process chart Flow process chart two handed process chart	
	Man machine chart, String diagram and flow diagram.	
	Work Measurement: Definition - Basic procedure in making a time study	
	- Employees rating factor - Application of time allowances - Rest,	
	Personal, Process, Special and Policy allowances – Calculation of	
	standard time – Problems – Basic concept of production study –	
	standard data, analytical estimating and Pre determined Motion Time	
	System (PMTS).	
		15 Uro
""	PRODUCTION PLANNING AND QUALITY CONTROL	15 115
	Production Planning and Control: Introduction – Major functions of	
	production planning and control – Pre planning – Methods of forecasting	
	- Routing and scheduling - Dispatching and controlling - Concept of	
	Critical Path Method (CPM)-Description only. Production – types-Mass	
	Economic Batch Quantity (EBQ) – Principles of product and process	
	planning – make or buy decision – problems.	
	Quality Control: Definition - Objectives - Types of inspection - First	
	piece, Floor and centralized inspection – Advantages and disadvantages.	
	Quality control – Statistical quality control – Types of measurements –	
	- Operating Characteristics curve (O C curve) - Sampling inspection -	
	single and double sampling plan – Concept of ISO 9001:2008 Quality	
	Management System Registration / Certification procedure – Benefits of	
	ISO to the organization.	

IV	PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT	15 Hrs
	 Principles of Management: Definition of management – Administration - Organization – F.W. Taylor's and Henry Fayol's Principles of Management – Functions of Manager – Types of Organization – Line, Staff, Taylor's Pure functional types – Line and staff and committee type – Directing – Leadership - Styles of Leadership – Qualities of a good leader – Motivation – Positive and negative motivation –Modern management techniques- Just In Time – Total Quality Management (TQM) – Quality circle – Zero defect concept – 5S Concept-Management Information Systems. Personnel Management: Responsibility of human resource management – Selection procedure – Training of workers – Apprentice training – On the job training and vestibule school training – Job evaluation and merit rating – objectives and importance – wages and salary administration – Components of wages – Wage fixation – Type of wage payment – 	
	Halsey's 50% plan, Rowan's plan and Emerson's efficiency plan – Problems.	
V	FINANCIAL MANAGEMENT AND MATERIAL MANAGEMENT	15 Hrs
	Financial Management: Fixed and working capital – Resources of capital – shares preference and equity shares – debentures – Type of debentures – Public deposits, Factory costing – direct cost – indirect cost – Factory overhead – Selling price of a product – Profit – Problems. Depreciation – Causes – Methods - Straight line, sinking fund and percentage on diminishing value method – Problems. Material management: Objectives of good stock control system – ABC analysis of inventory – Procurement and consumption cycle – Minimum Stock, Lead Time, Reorder Level-Economic order quantity problems – supply chain management – Introduction – Purchasing procedure – Store keeping – Bin card.	

Text Books :

- Industrial Engineering and Management, O.P. Khanna, Revised Edition Publications (P) Ltd – 2004, 67/4 Madras House, Daryaganj, New Delhi – 110002.
- 2) Engineering Economics and Management, T.R. Banga & S.C. Sharma, McGraw Hill Editiion. 2 2001, New Delhi.

Reference Books :

- 1) Management, A global perspective, Heinz Weihrich, Harold Koontz, 10th Edition, McGraw Hill International Edition 1994.
- 2) Essentials of Management, 4th Edition, Joseph L.Massie, Prentice-Hall of India, New Delhi 2004.

22061 INDUSTRIAL ENGINEERING AND MANAGEMENT

Model Question Paper – I

Time: 3 Hrs.

Question Pape

Max. Marks : 75

PART– A Marks 15 x 1= 15

Note : Answer any 15 Questions. All Questions carry equal marks.

- 1. What is a plant?
- 2. Define line layout.
- 3. What is meant by maintenance?
- 4. State any two provisions of safety.
- 5. Define method study.
- 6. State any two objectives of method study.
- 7. What is operation process chart?
- 8. What is PMTS?
- 9. What is PPC?
- 10. Define scheduling.
- 11. Explain first piece inspection.
- 12. What do you mean by producer's risk?
- 13. Define Administration.
- 14. Harmony and not discord explain.
- 15. What is an organization chart?
- 16. Define motivation.
- 17. State the types of capital required.
- 18. List the sources of capital.
- 19. What is meant by prime cost?
- 20. Define depreciation.
| Marks 5 x 12 = 60 | |
|---|----------------------|
| Answer all Questions | 5x12=60 |
| 21.A. What are the different types of plant layout? Explain any two with no
(OR) | eat sketches. (12) |
| B. State the important Provisions of Factories Act 1948 governing safe | ety & health of |
| workers. | (12) |
| 22. A. With a neat sketch. Explain man type flow process chart. | (12) |
| (OR) | |
| B. Write short notes on the following | |
| (i) Ratio delay study | (6) |
| (ii) Analytical estimation | (6) |
| 23. A. What is forecasting? Explain the different techniques of forecasting | . (12) |
| (OR) | |
| B. Write short notes on | |
| (i) Double sampling plan | (6) |
| (ii) OC curve for a simple plan | (6) |
| 24. A. A Worker completes a job in 6 hrs. The allowed standard time for t | he job is 8 hrs. His |
| wage | |
| Rate is Rs.5 per hour. Calculate the total earnings of the worker un | nder the following |
| Systems of payment | |
| (i) Halsey's 50% plan | (6) |
| (ii) Rowan's plan | (6) |
| (OR) | |
| B. State the principles of management as enumerated by Henry Fayol. Expla | ain any eight of |
| them | (12) |
| 25. A. Explain by means of a block diagram how the selling price of a produc (12) | t is determined. |
| B. Explain how total cost of inventory can be efficiently controlled by | "ABC Analysis" |
| technique. | (12) |

PART – B

22061 INDUSTRIAL ENGINEERING & MANAGEMENT-II MODEL QUESTION PAPER – II

Max Marks: 75

Time: 3 Hrs

PART – A

<u>Marks 15 x 1 = 15</u>

Answer any 15 Questions – All Questions Carry Equal Marks

- 1. Define Plant
- 2. List any two Safety law's
- 3. State one major factor that causes industrial dispute.
- 4. For what purpose screw conveyors are used.
- 5. Give any two objectives of work study.
- 6. List any four tools used in method study.
- 7. Define standard time.
- 8. What is production study.
- 9. What is the definition of EBQ?
- 10. State the UCL & LCL of R-Chart?
- 11. Explain the term dispatching.
- 12. Define attributes inspection.
- 13. What are the types of organization?
- 14. What are two methods of wage payment plan?
- 15. Define Quality Circle.
- 16. State any two qualities of a good leadership.
- 17. State any two types of debentures.
- 18. State any two objectives of stock control system.
- 19. What is lead time?
- 20. What is ABC analysis?

PART – B

Marks 5 x 12=60

Answer all the Questions

21	a. i)	What are the different types of plant layout? Explain any one	/ one (6)
		type of layout with a neat sketch. What are its advantages.	

ii) Explain the various factors to be considered for selection of (6) equipment.

(or)

- Briefly explain the procedure for preventive maintenance. (6)
- b.i)
 - ii) Explain the planning for accident prevention. (6)
- 22. a.i) Explain ratio delay study.

ii) Explain various allowance added to basic time.

(or) (6)

(6)

			(6)
	b.ı) ii)	State the objectives of work measurement. Describe with diagram how rating factor is applied in calculating normal time for below average performer.	(6)
22	c i)		(6)
23	ii)	Explain OC curve for a simple plan. Explain roaming inspection. (or)	(6)
	b.i)	Explain the procedure for construction \overline{of} a X- Chart.	(6)
	ii)	Explain characteristics of a job order type production.	(6) (6)
24	a.i)	Explain any four of the Henry Fayol's principles of	(0)
	ii)	Explain the key factors for the success of TQM. (or)	(6)
			(6)
	b.I)	Explain the selection process in personnel management.	
	ii)	Explain the factors affecting wage structure.	(6)
25.	a.i)	Write short notes on receiving a issuing of material.	(6)
	ii)	Briefly explain purchasing procedure. (or)	(6)
	b)i)	Explain general overhead in factory costing.	(6)
	11)	Explain the factors which determine the working capital requirements.	(6)



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L-SCHEME

2011-2012

22062 - COMPUTER INTEGRATED MANUFACTURING

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22062
Semester	:	VI
Subject Title	:	COMPUTER INTEGRATED MANUFACTURING

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instr	uctions		Examinatio	n	
Computer	Hours/ Week	Hours/ Semeste r		Marks		Duration
Manufacturing	5	80	Internal Assessment	Board Examinatio n	Total	3 Hrs
			25	75	100	

Topics and Allocation of Hours:

Unit No	Topics	Hours
I	INTRODUCTION CIM AND COMPUTER AIDED DESIGN & ANALYSIS	15
II	COMPUTER AIDED MANUFACTURING AND RAPID PROTOTYPING	15
	CNC MACHINE AND COMPONENTS	15
IV	PART PROGRAMMING	15
V	FMS, INTEGRATED MATERIAL HANDLING AND ROBOT	15
	REVISION AND TEST	5
	Total	80

RATIONALE:

As per the latest requirements in the Industries this enables to learn the assistance of computer in the field of design and manufacturing areas. It's able to learn the latest manufacturing concepts of in the shop floors and manufacturing methods like RPT. They are able to know about the working of principles of CNC machines and programming techniques are included. The application of material handling equipments and robots are learnt based on the automation in the industries.

OBJECTIVES:

- Understand the concept and requirement of the integration of the design and manufacturing.
- Acquire knowledge about the computer assistance in the design process and analysis.
- Understand the concepts of manufacturing with computer assistance in the shop floor.
- Learn the principle and working of the CNC machines.
- Understand the principle of latest manufacturing machines like EDM and RPT.
- Learn the method of CNC programming with international codes.
- Acquire the knowledge in the material handling equipment and robot.

22062 - COMPUTER INTEGRATED MANUFACTURING DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
Ι	 INTRODUCTION CIM AND COMPUTER AIDED DESIGN & ANALYSIS CIM: Introduction of CIM – concept of CIM - evolution of CIM – CIM wheel – Benefits – integrated CAD/CAM. CAD: Computer Aided Design – Introduction – CAD definition – Shigley's design process – CAD activities – benefits of CAD. Types of CAD system – Host and terminal based CAD system - PC based CAD system – workstation based CAD system – graphics workstation – CAD software packages. 2D&3D transformations – translation, scaling, rotation and concatenation. Geometric modeling: Techniques: Wire frame modeling – surface modeling – solid modeling: Boundary representation – Constructive Solid Geometry – Comparison. Graphics standard – Definition –Need - GKS – IGES – PHIGS – DXF. Cost involved in design changes – Concept of Design for Excellence (DFX) – Guide lines of Design for Manufacture and assembly (DFMA). Finite Element Analysis: Introduction – Development - Basic steps – Advantage. 	15 Hrs
11	COMPUTER AIDED MANUFACTURING AND RAPID PROTOTYPING CAM: Definition – functions of CAM – benefits of CAM – Group technology – Part families - Parts classification and coding - coding structure – Optiz system, MICLASS system and CODE System - process planning – CAPP – Types of CAPP : Variant type, Generative type – advantages of CAPP - production planning and control – computer integrated production management system – Master Production Schedule (MPS) – Capacity planning – Materials Requirement Planning (MRP) – Manufacturing Resources Planning (MRP-II)– Shop floor control system - Just in time manufacturing philosophy- Introduction to enterprises resources planning. Product Development Cycle – Sequential engineering – Concurrent engineering. Rapid proto typing: concept and applications – materials – types - Stereo lithography – laser sintering – Deposition Modeling - 3D printing.	15 Hrs
- 111	CNC MACHINE AND COMPONENTS CNC Machines: Numerical control – definition – components of NC systems – development of NC – DNC – Adaptive control systems – working principle of a CNC system – Features of CNC machines - advantage of CNC machines – difference between NC and CNC – Construction and working principle of turning centre – Construction and working principle of machining centers – machine axes conventions turning centre and machining centre – design considerations of NC machine tools. CNC EDM machine – Working principle of die sinking and wire EDM machines - Coordinate Measuring Machines: construction and working principles.	15 Hrs

	Components of CNC machine. Drives: spindle drive – dc motor – Feed drives – dc servo motor and stepper motor – hydraulic systems – Slide ways – requirement – types – friction slide ways and anti friction slide ways - linear motion bearings – recirculation ball screw – ATC – tool magazine – feedback devices – linear and rotary transducers – Encoders - in process probing.	
IV	PART PROGRAMMING PART PROGRAMMING: NC part programming – methods - manual programming – conversational programming – APT programming - Format: sequential and word address formats - sequence number – coordinate system – types of motion control: point-to-point, paraxial and contouring – Datum points: machine zero, work zero, tool zero NC dimensioning – reference points – tool material – tool inserts - tool offsets and compensation - NC dimensioning – preparatory functions and G codes, miscellaneous functions and M codes –interpolation: linear interpolation and circular interpolation - CNC program procedure. Part Program – macro – sub-program – canned cycles: stock – mirror images – thread cutting – Sample programs for lathe : Linear and circular interpolation - Stock removal turning – Peck drilling – Thread cutting and Sample programs for milling: Linear and circular interpolation – mirroring – sub program – drilling cycle – pocketing – Generating CNC codes from CAD models – post processing	15 Hrs
V	FMS, INTEGRATED MATERIAL HANDLING AND ROBOT Types of manufacturing - introduction to FMS – FMS components – FMS layouts – Types of FMS: flexible manufacturing cell – flexible turning cell – flexible transfer line – flexible machining systems – benefits of FMS - introduction to intelligent manufacturing system – virtual machining. Computer Integrated material handling – AGV: working principle – types - benefits – Automatic Storage and Retrieval Systems (ASRS). ROBOT – definition – robot configurations – basic robot motion – robot programming method – robotic sensors - industrial applications: characteristics, material transfer, machine loading, welding, spray coating, assembly and inspection.	15 Hrs

Text Books :

- 1) CAD/CAM/CIM, R.Radhakrishnan, S.Subramanian, New Age International Pvt. Ltd.
- 2) CAD/CAM, Mikell P.Groover, Emory Zimmers, Jr.Prentice Hall of India Pvt., Ltd.
- 3) NC Programming, S.K.Sinha, Galgotia Publications Pvt. Ltd.

Reference Books :

- 1) CAD/CAM Principles and Applications, Dr.P.N.Rao, Tata Mc Graw Hill Publishing Company Ltd.
- 2) CAD/CAM, Ibrahim Zeid, Mastering Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- 3) Automation, Production Systems, and Computer-Integrated Manufacturing, Mikell P. Groover, Pearson Education Asia.
- 4) Computer control of manufacturing systems, Yoram Koren, McGraw Hill Book.

22062 COMPUTER INTEGRATED MANUFACTURING MODEL QUESTION PAPER-I

Time: 3 Hrs

Max Marks : 75

PART-A

Marks 15 x 1= 15

Answer any 15 Questions-All Questions carry equal marks.

- 1 Define is CAD.
- 2 List the benefits of CIM.
- 3 What is translation?
- 4 Mention the advantages of FEA.
- 5 Define CAM.
- 6 What is process planning?
- 7 What is concurrent engineering?
- 8 Mention the applications of RPT
- 9 Define NC.
- 10 Differentiate between NC and CNC.
- 11 What is encoder?
- 12 Mention the types of slide ways.
- 13 Mention the different formats of part program.
- 14 What is reference points?
- 15 Mention the different shapes of tool inserts.
- 16 What is NC dimensioning?
- 17 List the benefits of FMS.
- 18 What is AGV?
- 19 Define robot.
- 20 List the robot programming methods.

PART – B Marks 5 x 12=60 Answer all the Questions

21	a i)	Mention the basic steps of FEA.	4
	ii)	Explain the activities of CAD in design process.	8
		(or)	
	bi)	Compare the wire frame modeling with surface modeling.	2
	ii)	Explain the constructive solid geometry modeling technique.	10
22	a i)	Write briefly about Enterprise Resource Planning.	4
	ii)	What is GT? Explain the optiz system of coding.	8
		(or)	
	bi)	Write briefly about the Shop Floor Control.	4
	ii)	Explain the computer integrated production management	8
		system.	
23	a i)	Explain the working of ATC.	4
	ii)	Explain the working principle of turning centre.	8
		(or)	
	bi)	What is the feed back device?	2
	ii)	Explain the working of linear and rotary transducers.	10
24	ai)	Write briefly about conversational programming.	4
	ii)	Explain about the APT programming language.	8
		(or)	

	b i) ii)	Write the procedure to create CNC manual part program. Write a part program to create a mirroring image in a CNC milling machine using a sub program.	4 8
25	a i)	Explain the working principle of AGV.	8
	II)	Write briefly about ASRS.	4
	h i)	(UI) Write briefly on intelligent manufacturing system	1

b i)Write briefly on intelligent manufacturing system.4ii)Explain the different types of FMS.8

22062 COMPUTER INTEGRATED MANUFACTURING MODEL QUESTION PAPER-II

Time: 3 Hrs

PART-A

Max Marks: 75

Marks 15 x 1= 15

Answer any 15 Questions-All Questions carry equal marks.

- 1 List the benefits of CAD.
- 2 What is graphic workstation?
- 3 What is concatenation?
- 4 What is the need of graphic standard?
- 5 List the benefits of CAM.
- 6 What is capacity planning?
- 7 List the advantages of CAPP.
- 8 What is sequential engineering?
- 9 What are the advantages of CNC machine?
- 10 What are the purposes of CMM?
- 11 What are the requirements of slide ways?
- 12 What is the purpose of ATC?
- 13 What is NC part programming?
- 14 What is tool offsets?
- 15 What is linear interpolation?
- 16 What is sub program?
- 17 What is FMS?
- 18 What is virtual machining?
- 19 List the types of sensors used in robot.
- 20 List the benefits of AGV

PART – B

Marks 5 x 12=60

Answer all the Questions

21	a i)	Write briefly about the cost involved in design process.	4
	ii)	Explain the Shigley's design process.	8
	,	(or)	
	bi)	What is graphic standard?	2
	ii)	Explain the IGES graphic standard.	10
22	ai)	Write briefly about Material Requirement Planning.	4
	ii)	What is CAPP? Explain the generative method of CAPP.	8
		(or)	
	bi)	Write briefly about the product development cycle.	4
	ii)	What is RPT? Explain the working of stereo lithography.	8
23	ai)	Write briefly about adaptive control system.	4
	ii)	Explain the working principle of CNC system.	8
		(or)	
	bi)	Write briefly about the linear motion bearing.	2
	ii)	Explain the working principle of CMM.	10
24	a i)	Write briefly about tool inserts.	4
	ii)	Write a part program to make M20 X 1.5 thread in CNC lathe.	8
		(or)	
	bi)	Explain the types of motion control in CNC machine.	4
	ii)	Write a part program for stock removal in turning.	8

25 ai)	Explain the FMS components.	8
ii)	Explain the FMS layout with sketches.	4
-	(or)	
b i)	Write briefly about the basic robot motion.	4
ii)	Explain the different industrial applications of robot.	8



DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)

L - SCHEME 2011 - 2012

22263 - PLASTIC MOULDING TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22263
Semester	:	VI
Subject Title	:	PLASTIC MOULDING TECHNOLOGY

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
		Hours/ Semester	Marks			
SUBJECT	Hours/ Week		Internal	Board	Total	Duration
			Assessment	Examination	(Marks)	(Hrs)
			(Marks)	(Marks)	(
PLASTIC MOULDING TECHNOLOGY	5	80	25	75	100	3

Topics and Time allocation

UNIT	TOPIC	TIME (Hrs)
I	Plastic Materials and Processing techniques	15
II	Injection Moulding Machine, Injection Mould and its functional system	15
	Injection Mould Design	15
IV	Compression, Blow and Transfer moulding machine and Mould Design	15
V	Plastic Product Design, Decoration of Plastic Products &	15
	Maintenance and repairs of injection moulds	
	Revision, Test	5
	Total	80

RATIONALE: -

Plastic plays an important role in the present day industrial products and for the manufacture of plastic components lot of moulds are used. Hence Considering the immense potential in the fields of Plastic processing, mould design, making and maintenance, it is essential to understand the basics of plastic materials, processing and moulding technology adopted to convert the raw plastic material into desired products.

OBJECTIVES

- > Familiarise different plastics materials and their properties
- Familiarise of the conventional injection-moulding machine types, their specification, operation terminology and their parts.
- > Compare different moulding processes used in industries, their application
- > Explain the design procedure for injection moulding.
- > Explain the design procedure for compression moulding
- > Explain the concepts in the design of blow moulds.
- > Appreciate the decoration techniques, plating techniques used for plastic components.
- > Explain the working of injection moulding machine
- > Understand the intermediate injection moulding design concepts

22263 - PLASTIC MOULDING TECHNOLOGY

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
No.		
	Plastic Materials and Processing techniques	
	1.0 Plastics: Introduction – type of Plastics - Thermo Plastic Materials – Thermo	
	setting Materials - Commodity Plastics - Engineering materials - Density -	
	Melting Temperature – Shrinkage – Bulk Factor – Moulding Pressure Properties –	
	Applications – Additives - Master Batches – Pigments.	15
	1.1 Injection Moulding: Hot Runner Injection Moulding Process, Multi colour	
1	and multi component Injection Moulding Process, Reaction Injection Moulding	
	Process.	
	12 Compression & Transfer Moulding - Compression Moulding Procedure.	
	Difference between Injection and Compression moulding Transfer Moulding	
	Advantages and Disadvantages	
	1 3 Blow Moulding : concept and working principle only	
	1.4 Other processes: Rotational Moulding Thermoforming Extrusion- Pipe	
	extrusion Blown film Cast film extrusion. Rod Extrusion – Co extrusion	
	Injection Moulding machine, injection mould and its functional systems	
	2.1 Injection Moulding Machines: Basic parts and functioning of an injection	
	moulding machine. Types of injection moulding machine (Screw type & Plunger	
	Type) – Single stage and two stage – Clamping unit (Toggle & Hydraulic) -	
	Types of nozzles – Typical injection. Moulding cycle, Cycle time - Machine	15
	specifications (Definition only).	
	2.2 Injection Mould: - Terms used in connection with injection moulds,	
11	classification of moulds, Functions of the injection moulds.	
	2.3 Functional systems of injection mould – Sprue and runner system -	
	Runner, Cross section shape, Runner size, Runner layout – Gates, Necessity,	
	Centre gate, Edge gate, Balanced gating, Types of Gates.	
	Core and Cavity- Shrinkage calculation - Core and cavity dimension. Parting	
	surface: Flat Parting surface - Non flat parting surface - Venting - Mould	
	clamping - direct, indirect.	

	2.4 Cooling System Cooling Integer type cavity plates Cooling integer			
	type cave plate. Cooling belater. Cooling covity incorts. Cooling are incorts			
	type core plate - Cooling bolster – Cooling cavity inserts – Cooling core inserts			
	vvater connection and seals. (Concept & Description of design only)			
	2.5 Ejection system: Ejector grid - Ejector plates assembly – Ejector rod,			
	Ejector plate and ejector retaining plate - Methods of Ejection – Ejection from			
	fixed half- Sprue puller.			
	Injection Mould Design & Intermediate Moulds 3.1 –Basic procedure for mould design – Determination of mould size – Maximum number of cavities, Clamping force , Maximum clamping area, Required opening stroke. Computation of number of cavities, cavity layouts, number of parting lines, Design of runner and gate.	15		
III	3.2 Intermediate Moulds: Moulding external undercuts-Split mould - Finger cam, dog leg cam & track. Hydraulic & spring actuation of split - Side core and side cavity. Methods of actuation - Mould with internal undercut . Form pin			
	actuation, split core, jumping off - Mould for threaded component: Manual & automatic unscrewing methods hand mould for rotating & lose core methods -			
	Multi day light mould – Under feed mould – Triple day light mould – Hot runner unit mould, Advantages and Limitations, Hot runner nozzles & sprue, runner less			
	mould - Materials for Injection Mould – Standard Mould systems, Advantages			
	3.3 Alignment of Moulds: Eulertions of alignment, alignment with the axis of the			
	s.s Angliment of moulds. I uncludis of angliment, angliment with the axis of the			
	plasticating unit, internal alignment and interlocking, alignment of large moulds.			
	Changing of moulds – system for a quick change of moulds for thermoplastics,			
	mould exchanger for elastomer moulds.			
	Compression, Blow and Transfer Moulding machines and Mould Design 4.1 Compression & Transfer Moulding Machines: - Type of compression Moulding Machine - Toggle type machanical machine - Hudrauliaelly appreciated			
	Machine – Auxiliary Ram type machines (Vertical Transfer Machine) – Bottom			
IV	Transfer Machine – Machine Parts – Machine Specifications- Pot and plunger	15		
	I ranster machines			
	4.2 Compression & Transfer mould Design: Compression moulds -			
	Economic determination of no. of cavities, flash thickness allowances, design of			
	mould cavity, design of loading chamber, bulk factor, loading chamber depth &			
	heat requirement for heating the mould related to - curing time, breathing time. Materials for Compression mould.			

	Transfer Mould Design : Design of Pot and Plunger, runner & gate dimensions,	
	bulk factor Feed System, Economic determination of the number of cavities,	
	Technological determination of the number of cavities, design of mould cavity,	
	design of loading chamber, Heat losses and energy requirement to heat the	
	mould. Materials for Transfer mould. (Concept & Description of design only).	
	4.3 Blow moulding Machines - Extrusion Blow Moulding Machine (EBM) -	
	Stretch Blow Moulding Machine (SBM) – Injection Blow Moulding Machine (IBM)	
	 Machine Parts – Machine Specifications. 	
	4.4 Blow Mould Design: Mould layout, Pinch off, venting, Head die design,	
	parison diameter calculation, shrinkage calculation, design of mould clamping	
	accessories.	
	Plastic Product Design, Decoration of Plastic Products and Maintenance &	
	Repair of Injection Moulds:	
	5.1 Plastic Product Design: Wall thickness - Ribs and profiled structures -	
	Gussets or support ribs - Bosses - Holes - Radii & Corners - Tolerances -	15
	Coring - Undercuts – Draft angle.	
	5.2 Decoration of Plastic Parts: Painting and coating (Dipping, Spraying and	
	Depositing) – Metallizing (Vacuum metallization, Vacuum evaporation,	
	sputtering) – Plating (Electroless plating, Electrolytic plating) - Flame and arc	
v	spraying - hot foil stamping - hot transfer - In mold decorating (Film insert	
	molding, in mold transfer decoration, Powder coating) - Water transfer – Printing	
	(Pad printing, Screen printing, Sublimation printing, Flexography, Dry offset	
	printing) – Laser Marking, Vapor polishing, Decals - Understanding	
	Recycling Codes.	
	5.3 Maintenance of Injection Moulds: Advantages of Preventive maintenance,	
	maintenance of - cooling lines, mould surfaces, heating & control systems. Action	
	taken after examination and cleaning. Repair and alterations of injection moulds.	

Text Books:

1. Pye.R.G.W., "Injection Mould Design", Affiliated East – west press pvt Ltd, 2000

2. Athalye.A.S., 'Injection Moulding", 2nd Edn., Multi Tech Publishing Co., 1998

3. George menges and Paul mohren, "How to make Injection moulds", Hawer publishers, 1991

Reference Books:

1. Briston and Gosselin, "Introduction to Plastics", Newnes-Butterworths, London, 1970

2. Mills.N.J., "Plastics", ELBS, 1986

3. Dominick V.Rosato and Donald V.Rosato., "Injection Moulding Hand Book", CBS Publishers & Distributors, Delhi, 1987

4. Athalye.A.S., "Plastics Materials Handbook", Multi Tech Publishing Co., 1995

5. Athalye.A.S., "Moulding of Plastics", Multi Tech Publishing Co., 1998

22263 -PLASTIC MOULDING TECHNOLOGY **MODEL QUESTION PAPER-1**

Time : 3 Hrs

PART – A

Answer any fifteen questions

01. What is plastic?

- 02. Define melting temperature?
- 03. List out the types of compression moulding
- 04. Write down the working principle of thermoforming
- 05. Classify the injection moulding machine
- 06. What are the types of gates used in injection mould?
- 07. Define shrinkage
- 08. List out the parts available in ejection assembly
- 09. State the formula for maximum number of cavities
- 10. What is undercut?
- 11. Define daylight
- 12. What are the factors affect the cooling lines?
- 13. Write the formula for Economic determination of the number of cavities
- 14. Define Curing time
- 15. Define Bulk factor
- 16. What is parison?
- 17. List out the types of holes
- 18. Write down advantages of painting
- 19. Write any two symbols for recycling plastic materials
- 20. what is affect cooling lines cross section?

PART – B

Answer all Questions	5x12=60

- 21 (a) (i) Differentiate between thermoplastic and thermoset
 - (iii) Explain Hot runner injection moulding with neat sketch and state its merits (8) (OR)
 - (b) (i) Explain in detail working principle of compression moulding with neat sketch (12)
- 22 (a) (i) What is the use of clamping unit ? Explain any one type with sketch (8)

(ii)Draw the algorithm for a mould design procedure

(OR)

- (b) (i) Explain about ejection system? Write the types of ejection and explain any one (8)
 - (ii) Write short notes on parting surface

(4)

(4)

(4)

1x15=15

: 75

Max. Marks

23 (a) (i) Write short notes on: Maximum clamping area and Required opening	stroke (6)
(ii) Briefly explain about Dog leg cam actuation (OR)	(6)
(b) (i) How can you design mould for threaded component and	
explain any one type of ejection method for threaded component	(6)
(ii) Write short notes on: Mould exchanger for elastomer moulds and	
Alignment of large moulds	(6)
24 (a) (i) Briefly explain about Standard Mould Base with neat sketch	(6)
(ii) Sketch and explain Head die design which is used in blow moulding	(6)
(OR)	
(b) (i) Briefly explain about bottom transfer machine	(6)
(ii) Explain Design of pot and plunger used in transfer mould	(6)
25 (a) (i) Briefly explain Wall thickness and gussets with neat sketch	(6)
(ii) Define plating and Explain any one type of plating with neat sketch	(6)
(OR)	
(b) (i) Briefly explain :Understanding Recycling Codes(ii) Briefly explain about Maintenance of Injection Moulds	(4) (8)

22263,PLASTIC MOULDING TECHNOLOGY MODEL QUESTION PAPER II

Time : 3 Hrs

PART – A

Max. Marks : 75

5x12=60

1x15=15

Answer any fifteen questions

All question carry equal marks.

- 1. Give any two example for thermoplastic
- 2. What is meant by Additives
- 3. List out the types of Blow moulding
- 4. Give any two difference between Transfer and compression moulding
- 5. Write down the types of Runner
- 6. Explain moulding cycle
- 7. What is the need of venting?
- 8. Write any two types of ejection system
- 9. Write two ejection methods for threaded component
- 10. Explain Clamping force
- 11. What is Standard Mould systems
- 12. What are the uses of hot runner unit mould?
- 13. What is loading chamber
- 14. What do you mean Flash?
- 15. Define breathing time
- 16. What is pinch off?
- 17. What is the purpose of gussets?
- 18. Give two advantages about decorating of plastics
- 19. List out the types of printing
- 20. What is advantages of preventive maintenance?

PART – B

Answer all Questions

21 (a) (i) What do you mean thermoset ? Explain Reaction Injection Moulding Process

with neat sketch	(8)
(ii) Explain Pipe extrusion with neat sketch and state its Applicatio (OR)	n (4)

- (b) (i) Explain working principle of transfer moulding with neat sketch (6)
 - (ii) Write the working principle of blow moulding and explain Rotational Moulding (6)
- 22 (a) (i) List out the types of nozzles Explain any one type with sketch (6)

(ii)what is the use of gate and explain any one type

(OR)

- (b) (i) with the help of neat sketch briefly explain about Plunger Type injection moulding? (8)
 - (ii) Write short notes on cooling system

(6)

(4)

23 (a)	(i) Write short notes on: internal alignment(ii) What is meant by Day light mould and explain triple day light mould	(6)
	with neat sketch	(6)

(OR)

(b)	(i) How can you eject the mould which is having Unde	ercut and explain any one
	type of ejection method for Undercut	(8)
	(ii) Explain about hot runner nozzle	(4)

24 (a)	(i) Briefly explain parison diameter calculation	(4)
	(ii) Write short notes on shrinkage calculation	(4)

(iii) Briefly explain about Technological determination of the number of cavities (4)

(OR)

(b)	(i) Briefly explain about Toggle type mechanical machine	(8)		
	(ii) Explain Machine Specification transfer moulding	(4)		
25 (a) (i) Briefly explain Bosses and Tolerances with neat sketch	(6)		
(ii) Define metalizing and Explain any one type of metallization	n with neat sketch (6)		
	(OR)			
(b)	(i) Briefly explain about Film insert molding	(6)		
(ii) Briefly explain about maintenance of - mould surfaces, heating & control				
	systems	(6)		



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22064 – COMPUTER INTEGRATED MANUFACTURING PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Subject Title	:	COMPUTER INTEGRATED MANUFACTURING PRACTICAL
Semester	:	VI
Subject Code	:	22064
Course Code	:	1220
Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester : 16 Weeks

Subject	Instr	uctions	Examination				
Computer Integrated	Hours/ Week	Hours/ Semester		Marks		Duration	
Manufacturing Practical	6	06	Internal Assessment	Board Examination	Total	3 Hrs	
	o	90	25	75	100		

OBJECTIVES:

- Study the working principle of CNC machines
- Study the datum points and offsets.
- Differentiate incremental System with absolute system
- Study the simulation software package.
- Write program and simulate in the Lathe software and Milling software.
- Prepare a part program, edit and execute in CNC Turning centre.
- Prepare a part program, edit and execute in CNC Machining centre.
- Produce components in the CNC Turning centre and CNC Machining centre.

Introductions (12Hours)

- 1. Study of CNC lathe, milling
- 2. Study of international standard G-Codes and M-Codes
- 3. Program writing Turning simulator Milling simulator, IS practice commands menus
- 4. Editing the program in the CNC machines.
- 5. Execute the program in the CNC machines.

PART A (Simulation) – 36 Hrs.

CNC Turning Simulation

1. Create a part program for step turning and simulate in the software - Using Linear interpolation.



2. Create a part program for taper turning and simulate in the software - Using Box turning cycle.



3. Create a part program for circular interpolation and simulate in the software - Using Circular interpolation.



4. Create a part program for multiple turning operations and simulate in the software - Using Stock removal cycle.



5. Create a part program for thread cutting, grooving and simulate in the software - Using canned cycle.



6. Create a part program for internal drills, boring and simulate in the software.



CNC Milling Simulation

1. Create a part program for grooving and simulate in the software - Using Linear interpolation and Circular interpolation.



2. Create a part program for drilling and counter sinking and simulate in the software - Using canned cycle.



3. Create a part program for mirroring and simulate in the software - Using subprogram.



4. Create a part program for rectangular and circular pocketing and simulate in the software - Using canned cycle.



PART B (Machining) – 36 Hrs.

CNC Turning Machine Material: Aluminum or acrylic fibre rod or Plastic

1. Using Box turning cycle – Create a part program for step and taper turning and produce component in the Machine.



2. Using Circular interpolation - Create a part program for circular interpolation and produce component in the Machine.



3. Using Stock removal cycle – Create a part program for multiple turning operations and produce component in the Machine.



4. Using canned cycle - Create a part program for thread cutting, grooving and produce component in the Machine.



CNC Milling Machine Material: Aluminum or acrylic fibre or plastic

1. Using Linear interpolation and Circular interpolation – Create a part program for grooving and produce component in the Machine.



2. Using canned cycle - Create a part program for drilling, counter sinking and produce component in the Machine



3. Using subprogram - Create a part program for mirroring and produce component in the Machine.



Revision and Test

12 Hrs

BOARD EXAMINATION

<u>Note:</u> Examination should be conducted to produce the components in the Machine. The exercises should be given accordingly by the external examiner. Students should be allowed to the machine after simulation and with print out.

Allocation of marks for Board Examination

PART –A		
Writing the part program	:	20
Execution/ Simulation in the software	:	20
PART-B		
Enter and editing the program in the machine	:	20
Component machining	:	10
Viva voice	:	5
External Marks	:	75

Minimum Facilities required for 60 intakes. Based on the intake strength the facilities should be improved.

- 1. Personal computer (Pentium processor) 15 Nos.
- 2. Off line CNC Lathe and Milling simulation software 15 users.
- 3. CNC Turning Machine 2 Nos.
- 4. CNC Milling Machine 2 Nos.
- 5. Laser Printer 1 No.



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22265 - PRESS TOOLS-II PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME (Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22265
Semester	:	VI
Subject Title	:	PRESS TOOLS-II PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
			Marks			
SUBJECT	Hours/ Week	Hours/ Semester	Internal Assessmen t (Marks)	Board Examination (Marks)	Total (Marks)	Duration (Hrs)
PRESS TOOLS-II PRACTICAL	4	64	25	75	100	16

Objectives

At the end of the practice, the students will be able to

- > Manufacture press tool components as per the given drawing.
- > Assemble the components manufactured.
- > Set the tools manufactured in the OBI . gap frame press.
- > Adjust the shut height, operate the press to take trial production.
- > Compare the result with the requirement and to do the necessary corrections if needed.
- Train the students on tool maintenance and wear correction to increase the life of the tool and to restore the process capability of the tool.

Detailed Syllabus

Ex.No.	Name of the exercise	Time in
		Hours
1.	Manufacture of V Bending tool	12
2.	Manufacture of Edge bending tool	12
3.	Manufacture of combination Tool	12
4.	Manufacture of drawing tool (single stage)	12
5.	Manufacture of embossing / coining tool	12
6.	Die Maintenance practice :-	04
	1. Trim die burr correction procedure	
	2. Draw die / form die bead correction procedure	
	TOTAL	64 Hours

Note:-

- 1. Batch size should not be more than 5 students for class work.
- 2. For examination, exercise Should be given to students individually and not in batches.
- 3. The examination duration is 16 hours.
- Students should be trained in Press Setting, Tool setting, shut height Adjustment, trial production using the tool fabricated by them and rectification of tool defects if any.
- 5. For Board examination any one of the above tool (slno 1 to 5) is to be manufactured, fitted in the press and trial production should be taken. The evaluation of the performance should be based on the component dimensions and finish obtained from the tool fabricated by the student during the 16 hours examination.
- 6. The 6th exercise Die maintenance practice is compulsory and cannot be counted for 80%.
- In examination, Knowledge on die maintenance should be evaluated for 10 marks by viva voce.

SCHEME OF EXAMINATION:

Manufacture of Tool	-	25marks
Tool finish	-	20 marks
Component finish / accuracy	-	10 marks
Tool setting & trial production	-	10 Marks
Viva Voce on die maintenance	-	10 Marks
lotal	-	75 Marks
DETAILS OF THE EQUIPMENTS

NAME OF THE BRANCH / COURSE	MECHANICAL ENGINEERING (TOOL & DIE)
YEAR	THIRD
SEMESTER	VI
NAME OF THE LABORATORY	22265 PRESS TOOLS – II PRACTICAL

S.NO	LIST OF THE EQUIPMENTS WITH SPECICATIONS REMARKS, IF	QUANTITY
	ANY	REQUIRED
1	Centre Lathe, 4 ¹ / ₂ ' bed length	5
2	Drilling machine	2
3	Shaping machine, stroke length 300mm	2
4	Vertical milling machine	2
5	Surface grinding machine	2
6	Bench vice	10
7	Fitting file set	10
8	Tap set	4
9	Surface plate	2
10	Vernier height gauge 0-250mm	2
11	Dial test indicator with magnetic stand	2
12	Angle plate	2
13	Mechanical power press (15tons- 100 tons)	1



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22266 - PLASTIC MOULDS PRACTICAL

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22266
Semester	:	VI
Subject Title	:	PLASTIC MOULDS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 16 weeks

	Instructions		Examination			
				Marks		
SUBJECT	Hours/	Hours/	Internal	Board	Total	Duration
	Week	Semester	Assessment	Examination	(Marks)	(Hrs)
			(Marks)	(Marks)	(marks)	
Plastic Moulds	4	64	25	75	100	16
Practical	•				100	10

OBJECTIVES

- Design and fabricate single cavity injection mould
- Design and fabricate multi cavity injection mould
- Design and fabricate blow mould.
- Design and fabricate of compression mould
- Practice on different machining operations
- Use different machine tools in making plastic moulds

Detailed Syllabus

i) Design of Plastic Moulds:

- 1. Injection Mould Design: Methodical approach to mould design.
 - > Design of Hand injection mould
 - Design of three plate mould

2. Design of simple Compression Mould.

3. Design of simple Blow mould.

ii) Mould Design and Manufacture Exercises:

- 1. Design and Fabrication of single cavity hand injection mould (To suit to Hand Injection Moulding Machine)
- 2. Design and fabrication of multi cavity injection mould (To suit to Hand injection Moulding Machine)
- 3. Design and fabrication of simple compression mould.
- 4. Design and fabrication of simple blow mould.

Note:-

- 1. Batch size should not be more than 5 students for class work.
- 2. For examination, exercise should be given to students individually and not in batches.
- 3. The examination duration is 16 hours.
- 4. Students should be trained in setting the mould and to make necessary adjustments, trial production using the mould manufactured by them and rectification of mould defects if any.
- **5.** For Board examination any one of the above tool (slno 1 to 4) is to be manufactured and trial production should be taken. The evaluation of the performance should be based on the component dimensions and finish obtained from the mould manufactured by the student during the 16 hours examination.

<u>Record</u>: Mould drawings for all the exercises should be drawn in A2 sheet Manually, with all calculations filed neatly for Record work. The Design should include the Sectional Elevation, plan view, Bill of materials with all necessary calculation using methodological mould design.

Examination:

In the examination students have to Design and fabricate moulds for similar components as practiced in the class work

(48 Hrs)

SCHEME OF EXAMINATION:

Design of Mould	-20 marks
Mould making	-30 marks
Mould setting & trial production	-10 Marks
Component quality	-10 marks
Viva Voce	-05 Marks

Total

-75 Marks

DETAILS OF THE EQUIPMENTS

NAME OF THE BRANCH / COURSE	MECHANICAL ENGINEERING (TOOL & DIE)	
YEAR	THIRD	
SEMESTER	VI	
NAME OF THE LABORATORY	22266 PLASTIC MOULDS PRACTICAL	

S.NO	LIST OF THE EQUIPMENTS	QUANTITY REQUIRED
1	Centre Lathe, 4 ¹ / ₂ ' bed length	5
2	Drilling machine	2
3	Shaping machine, stroke length 300mm	2
4	Vertical milling machine	2
5	Surface grinding machine	2
6	Bench vice	10
7	Fitting file set	10
8	Tap sets	4
9	Surface plate	2
10	Vernier height gauge 0-250mm	2
11	Dial test indicator with magnetic stand	2
12	Angle plate	2
13	Hand operated Injection moulding machine	1
14	Hand operated Blow moulding machine	1
15	Air compressor – 5 bar capacity	1



DIPLOMA IN MECHANICAL ENGINEERING (TOOL& DIE)

L - SCHEME 2011 - 2012

22267 – PROJECT WORK

DIRECTORATE OF TECHNICAL EDUCATION GOVERNMENT OF TAMILNADU

L-SCHEME

(Implements from the Academic year 2011-2012 onwards)

Course Name	:	DIPLOMA IN MECHANICAL ENGINEERING (TOOL & DIE)
Course Code	:	1220
Subject Code	:	22267
Semester	:	VI
Subject Title	:	PROJECT WORK

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
Project	Hours/W eek	Hours/ Semester	Marks			Duration
VVOIK	Internal Board Assessment Examination		Board Examination	Total	3 Hrs	
	Ö	90	25	75	100	

Project Work

The students of all the Diploma programmes (except Diploma in Modern office Practice) have to do a project work as part of the Curriculum and partial fulfillment for the award of Diploma by the state Board of Technical Education and Training, Tamilnadu. In order to Encourage students to do worth while and innovative projects, every year prices are awarded for the best three projects i.e institution wise, region wise and state wise. The selection of project work should be taken up in Vth Sem of study. The first project review should be done in 14th week of study in V Semester. The Second project review should be done in the 8th week of the study in the VIth Semester.

a) Internal Assessment mark for Project work & Viva Voce:

Project Review I Project Review II Attendance	6 th week 14 th week	···· ···	10 marks 10 marks 05 marks
Total			 25 marks

b) Project work & Viva Voce Board Examination

The Allocation of	Marks:	
Viva Voce		 15 marks
Project Report		 10 marks
Demonstration		 15 marks
Applicability of the	e Project	 05 marks
Total		 45 marks

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	45
Marks for answers of 15 questions which is to be set by the external examiner from the given question bank consisting of questions in the following three topics Entrepreneurship, Disaster Management and Environmental Management. Out of fifteen questions five questions to appear from each of the above topics i.e. 5 questions x 3 topics = 15 questions 15 questions x 2marks = 30 Marks	30
Total	75

Written Test in 3 Topics for I Hour:

a) Entrepreneurshipb) Environmental Managementc) Disaster Management	5 questions X 2 marks = 5 questions X 2 marks = 5 questions X 2 marks =	10 marks 10 marks 10 marks

30 marks

Selection of Questions from Question Bank by the External Examiner, no choice need be given to the candidates.

DETAILED SYLLABUS

ENTREPRENEURSHIP, ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENTREPRENEURSHIP

- 1.1 Introduction Entrepreneur characteristics of Entrepreneur contributions of an Entrepreneur - functions of entrepreneur - Barriers to entrepreneurship - Roll of government in Entrepreneurial development.
- 1.2 Small scale industries (SSI) SSI role in country's economic growth importance of SSI starting of an SSI - Government organization and Non-governmental organizations supporting SSI - DIC,NSIC,SIDO,KVIC, Development banks and their objectives - role of commercial banks in assisting SSI - Women entrepreneurs and opportunities – Subsidy and concessions to Small Scale Industries.

2. ENVIRONMENTAL MANAGEMENT

- 2.1 Introduction Environmental Ethics Assessment of Socio Economic Impact Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.
- 2.2 Solid waste management Characteristics of Industrial wastes Methods of Collection, transfer and disposal of solid wastes Converting waste to energy Hazardous waste management Treatment technologies.
- 2.3 Waste water management Characteristics of Industrial effluents Treatment and disposal methods Pollution of water sources and effects on human health.
- 2.4 Air pollution management Sources and effects Dispersion of air pollutants Air pollution control methods Air quality management.
- 2.5 Noise pollution management Effects of noise on people Noise control methods.

3. DISASTER MANAGEMENT

- 3.1 Introduction Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..
- 3.2 Disaster Mitigation measures Causes for major disasters Risk Identification Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings -Cyclone shelters – Warning systems.
- 3.3 Disaster Management Preparedness, Response, Recovery Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services -Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

LIST OF QUESTIONS

1. ENTREPRENEURSHIP

- 1. Define the term Entrepreneur.
- 2. What is Entrepreneurship? Explain.
- 3. List the various stages of decisions an entrepreneur has to make before reaching the goal of his project.
- 4. What is innovation?
- 5. State briefly the role of an entrepreneur in the economic growth of a country.
- 6. List the characteristics of an Entrepreneur.
- 7. What are the critical elements of an Entrepreneur?

- 8. State the major functions of an Entrepreneur.
- 9. What are barriers to Entrepreneurship?
- 10. Define Small Scale Industry.
- 11. What are the qualities of Entrepreneur?
- 12. What are the benefits of Entrepreneur?
- 13. What are the various SSI that can flourish in your district?
- 14. Identify the infrastructural needs for an industry.
- 15. What are the various agencies involved in the establishment and development of various SSI?
- 16. Name some of the agencies funding SSI.
- 17. Explain the roles played by Government in Entrepreneurial development.
- 18. What are the various concessions and incentives available for a SSI.
- 19. Name some consumer products with wide demand that can be manufactured by a SSI?
- 20. What is feasibility study?
- 21. What is the importance of SSI?
- 22. What is DIC? State its functions.
- 23. What is NSIC? State its functions.
- 24. What is SIDO? State its functions.
- 25. Name the Development Banks in India working towards Entrepreneurial development.
- 26. State the role of commercial bank in assisting SSI sector.
- 27. What are the different phases of Entrepreneurial Development programme?
- 28. What is an Industrial Estate?
- 29. What are the facilities available in an Industrial Estate?
- 30. Identify the various training agencies associated with SSI.
- 31. List the governmental agencies from whom you shall get financial assistance for a SSI.
- 32. What is KVIC? State its objectives.
- 33. Name some state finance corporations.
- 34. What are the steps involved in preparing a feasibility report?
- 35. What are the factors to be considered regarding raw materials for a SSI?
- 36. What are the features of a SSI?
- 37. What are the advantages of becoming an Entrepreneur?
- 38. Name the Organizations offering assistance for the development of Women entrepreneurs.
- 39. State the business opportunities for Women entrepreneurs.
- 40. State the different subsidies given to SSI's.

2. ENVIRONMENTRAL MANAGEMENT

- 1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
- 2. Define Environmental Ethic.

- 3. How Industries play their role in polluting the environment?
- 4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
- 5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
- 6. What is meant by Hazardous waste?
- 7. Define Industrial waste management.
- 8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
- 9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
- 10. What are the objectives of treatments of solid wastes before disposal?
- 11. What are the different methods of disposal of solid wastes?
- 12. Explain how the principle of recycling could be applied in the process of waste minimization.
- 13. Define the term 'Environmental Waste Audit'.
- 14. List and discuss the factors pertinent to the selection of landfill site.
- 15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
- 16. Describe any two methods of converting waste into energy.
- 17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
- 18. Write a note on Characteristics of hazardous waste.
- 19. What is the difference between municipal and industrial effluent ?
- 20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
- 21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
- 22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.
- 23. Explain briefly when and how chemical / biological treatments are given to the waste water.
- 24. List the four common advanced waste water treatment processes and the pollutants they remove.
- 25. Describe refractory organics and the method used to remove them from the effluent.
- 26. Explain biological nitrification and de-nitrification.
- 27. Describe the basic approaches to land treatment of Industrial Effluent.
- 28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
- 29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
- 30. List out the names of any three hazardous air pollutants and their effects on human health.
- 31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
- 32. Differentiate between acute and chronic health effects from Air pollution.

- 33. Define the term Acid rain and explain how it occurs.
- 34. Discuss briefly the causes for global warming and its consequences
- 35. Suggest suitable Air pollution control devices for a few pollutants and sources.
- 36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
- 37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
- 38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
- 39. Explain the mechanism by which hearing damage occurs.
- 40. List any five effects of noise other than hearing damage.
- 41. Explain why impulsive noise is more dangerous than steady state noise.
- 42. Explain briefly the Source Path Receiver concept of Noise control.
- 43. Where silencers or mufflers are used ? Explain how they reduce the noise.
- 44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
- 45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

3. DISASTER MANAGEMENT

- 1. What is meant by Disaster Management? What are the different stages of Disaster management?
- 2. Differentiate Natural Disasters and Man made Disasters with examples.
- 3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
- 4. What is Disasters recovery and what does it mean to an Industry?
- 5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
- 6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
- 7. Specify the role played by an Engineer in the process of Disaster management.
- 8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
- 9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
- 10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
- 11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
- Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone
 A, (b) High damage risk zone, (c) Low damage risk zone.
- 13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.

- 14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
- 15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
- 16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
- 17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
- 18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
- 19. What is a fire escape in multistoried buildings ? What are its requirements ?
- 20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
- 21. Describe different fire fighting arrangements to be provided in an Industry.
- 22. Explain the necessity of disaster warning systems in Industries.
- 23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
- 24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
- 25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
- 26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
- 27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
- 28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
- 29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
- 30. Explain the necessity of medical care facilities in an Industry / Project site.
- 31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
- 32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
- 33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
- 34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
- 35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
- 36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
- 37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?

- 38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
- 39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
- 40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
- 41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.
- 42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
- 43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
- 44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
- 45. Why residential quarters are not constructed nearer to Atomic Power Plants?

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