



GOVERNMENT OF TAMILNADU

# **SYLLABUS**

**DIPLOMA IN ENGINEERING  
FIRST YEAR**

**2011-2012**

**SEMESTER SYSTEM**

**L - SCHEME**



**DIRECTORATE OF TECHNICAL EDUCATION  
TAMILNADU**



**DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY  
(FULL TIME)  
(SEMESTER SYSTEM)**

**(Implemented from 2011- 2012)  
L – SCHEME**

**(FIRST YEAR)  
REGULATIONS\***

\* *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.

**Sandwich (3½ years)**

The Course for the Diploma in Engineering (sandwich) 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 4<sup>th</sup> and/or during 7<sup>th</sup> 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

**Part Time (4 years)**

The course for the 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 Programme and 18 hrs. / Week for Part-Time Diploma Programmes.

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 Examination 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

Sl. No	Courses	H.Sc Academic	H.Sc Vocational	
		Subjects Studied	Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Diploma Regular and Sandwich Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma 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.

- For the 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	3½ Years	6½ 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. The curriculum outline for I, II, III, IV, V and VI Semester 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 sessional 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 sessional marks and 75 marks are allotted for Board Examination.

**8. Continuous Internal Evaluation:**

**For Theory Subjects:**

It has been decided to introduce Continuous Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

**i) Attendance**

**5 Marks**

(Award of marks for attendance 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 #**

**10 Marks**

2 Tests each of 2 hours duration for a total of 40 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: 05 marks

The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to : 05 marks

Total 10 marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6 <sup>th</sup> week	40	2 Hrs
Test II	Unit – III & IV	End of 12 <sup>th</sup> week	40	2 Hrs
Test III	<b>Model Examination - Compulsory</b> Covering all the 5 Units. (Board Examination-question paper-pattern).	End of 16 <sup>th</sup> week	75	3 Hrs

# - From the Academic year 2011-2012 onwards.

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

10 Questions X 1 mark	... ..	10 marks
5 Questions X 6 marks	... ..	30 marks
		-----
<b>Total</b>		40 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 from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2



**a) Sessional mark for Project Work & Viva Voce:**

Project Review I	...	<b>10 marks</b>
Project Review II	...	<b>10 marks</b>
Attendance	...	<b>05 marks</b>
		-----
Total	...	<b>25 marks</b>
		-----

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) Mark Allocation for Project Work & Viva Voce in Board Examination:**

Viva Voce	...	<b>25 marks</b>
Demonstration/Presentation	...	<b>20 marks</b>
		-----
Total	...	<b>45 marks</b>
		-----

**c) Written Test Mark (from 3 topics for 1 hour duration):** <sup>§</sup>

i) Entrepreneurship	5 questions X 2 marks	=	<b>10 marks</b>
ii) Environment Management	5 questions X 2 marks	=	<b>10 marks</b>
iii) Disaster Management	5 questions X 2 marks	=	<b>10 marks</b>
			-----
			<b>30 marks</b>
			-----

§ - 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 Examination	--	<b>45 Marks</b>
Written Test Mark (from 3 topics for 1 hour duration)	--	<b>30 Marks</b>
TOTAL	--	<b>75 Marks</b>

**A neatly prepared PROJECT REPORT has to be submitted individually during the Project Work & Viva Voce Board examination.**

**11. Scheme of Examinations:**

The Scheme of examinations for subjects in the I, II, III, IV, V and VI Semesters are given in **Annexure - II.**

**12. Criteria for Pass:**

1. 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 subject* out of the total prescribed maximum marks including both the sessional and the Board Examination 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's Theory* and a minimum of *35 marks out of 75 marks in the Board Practical Examinations*.

**13. Classification of successful candidates:**

Classification of candidates who pass 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 Semester and passes all the above Semesters in the first appearance itself and completes all papers including that of I & II Semester within the stipulated period of study 3/ 3½/ 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 papers including that of the I & II Semester within the stipulated period of study 3/ 3½ / 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 classification is applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2014 /April 2015 onwards (both joined in First Year in 2011-2012).

**14. Duration of a period in the Class Time Table:**

The duration of each period of instruction 1 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).

-xXx-

**L-SCHEME**  
**CURRICULUM OUTLINE**

**FIRST SEMESTER**

S.No.	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
21001	Communication English-I	5	-	-	5
21002	Engineering Mathematics-I	5	-	-	5
21003	Engineering Mathematics-II	5	-	-	5
21004	Engineering Physics-I	5	-	-	5
21005	Engineering Chemistry-I	5	-	-	5
21006	Engineering Graphics-I	-	6	-	6
21007	Engineering Physics-I Practical	-	-	2	2
21008	Engineering Chemistry-I Practical	-	-	2	2
<b>TOTAL</b>		<b>25</b>	<b>6</b>	<b>4</b>	<b>35</b>

**SECOND SEMESTER**

S.No.	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
22001	Communication English-II	4	-	-	4
22002	Engineering Mathematics-III	5	-	-	5
22003	Engineering Mathematics-IV	5	-	-	5
22004	Engineering Physics-II	4	-	-	4
22005	Engineering Chemistry-II	4	-	-	4
22006	Engineering Graphics-II	-	6	-	6
22007	Engineering Physics-II Practical	-	-	2	2
22008	Engineering Chemistry-II Practical	-	-	2	2
22009	Workshop Practice	-	-	3	3
<b>TOTAL</b>		<b>22</b>	<b>6</b>	<b>7</b>	<b>35</b>

**L-SCHEME**  
**SCHEME OF THE EXAMINATION**

**FIRST SEMESTER**

S.No	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks	Total Mark		
21001	Communication English-I	25	75	100	40	3
21002	Engineering Mathematics-I	25	75	100	40	3
21003	Engineering Mathematics-II	25	75	100	40	3
21004	Engineering Physics-I	25	75	100	40	3
21005	Engineering Chemistry-I	25	75	100	40	3
21006	Engineering Graphics-I	25	75	100	40	3
21007	Engineering Physics-I Practical	25	75	100	50	3
21008	Engineering Chemistry-I Practical	25	75	100	50	3
<b>TOTAL</b>		<b>200</b>	<b>600</b>	<b>800</b>		

**SECOND SEMESTER**

S.No.	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks	Total Mark		
22001	Communication English-II	25	75	100	40	3
22002	Engineering Mathematics-III	25	75	100	40	3
22003	Engineering Mathematics-IV	25	75	100	40	3
22004	Engineering Physics-II	25	75	100	40	3
22005	Engineering Chemistry-II	25	75	100	40	3
22006	Engineering Graphics-II	25	75	100	40	3
22007	Engineering Physics-II Practical	25	75	100	50	3
22008	Engineering Chemistry-II Practical	25	75	100	50	3
22009	Workshop Practice	25	75	100	50	3
<b>TOTAL</b>		<b>225</b>	<b>675</b>	<b>900</b>		

**L-SCHEME**  
**CURRICULUM OUTLINE**

**FIRST SEMESTER (PART TIME)**

S.No.	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
21001	Communication English-I	3	-	-	3
21002	Engineering Mathematics-I	4	-	-	4
21003	Engineering Mathematics-II	4	-	-	4
21004	Engineering Physics-I	3	-	-	3
21005	Engineering Chemistry-I	3	-	-	3
21007	Engineering Physics-I Practical	-	-	2	2
21008	Engineering Chemistry-I Practical	-	-	2	2
<b>TOTAL</b>		<b>17</b>	<b>-</b>	<b>4</b>	<b>21</b>

I - Semester Duration: 16 Weeks

21006 ENGINEERING GRAPHICS- I will be in the Second Year

**SECOND SEMESTER (PART TIME)**

S.No.	SUBJECT	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical hours	Total Hours
22001	Communication English-II	3	-	-	3
22002	Engineering Mathematics-III	3	-	-	3
22003	Engineering Mathematics-IV	3	-	-	3
22004	Engineering Physics-II	3	-	-	3
22005	Engineering Chemistry-II	3	-	-	3
22007	Engineering Physics-II Practical	-	-	2	2
22008	Engineering Chemistry -II Practical	-	-	2	2
22009	Workshop Practice			2	2
<b>TOTAL</b>		<b>15</b>	<b>-</b>	<b>6</b>	<b>21</b>

II - Semester Duration: 16 Weeks

22006 ENGINEERING GRAPHICS - II will be in the Second Year

**L-SCHEME**  
**SCHEME OF THE EXAMINATION**

**FIRST SEMESTER (PART TIME)**

S.No	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam. Marks	Total Mark		
21001	Communication English-I	25	75	100	40	3
21002	Engineering Mathematics-I	25	75	100	40	3
21003	Engineering Mathematics-II	25	75	100	40	3
21004	Engineering Physics-I	25	75	100	40	3
21005	Engineering Chemistry-I	25	75	100	40	3
21007	Engineering Physics-I Practical	25	75	100	50	3
21008	Engineering Chemistry-I Practical	25	75	100	50	3
<b>TOTAL</b>		<b>175</b>	<b>525</b>	<b>700</b>		

**21006** ENGINEERING GRAPHICS - I will be in the Second Year

**SECOND SEMESTER (PART TIME)**

S.No.	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal assessment Marks	Board Exam Marks	Total Mark		
22001	Communication English-II	25	75	100	40	3
22002	Engineering Mathematics-III	25	75	100	40	3
22003	Engineering Mathematics-IV	25	75	100	40	3
22004	Engineering Physics-II	25	75	100	40	3
22005	Engineering Chemistry-II	25	75	100	40	3
22007	Engineering Physics-II Practical	25	75	100	50	3
22008	Engineering Chemistry-II Practical	25	75	100	50	3
22009	Workshop Practice	25	75	100	50	3
<b>TOTAL</b>		<b>200</b>	<b>600</b>	<b>800</b>		

**22006** ENGINEERING GRAPHICS - II will be in the Second Year



**COMMUNICATION ENGLISH – I**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**

(Being implemented from the Academic Year 2011-2012 onwards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes

Subject Code : **21001**

Semester : **I SEMESTER**

Subject Title : **COMMUNICATION ENGLISH – I**

Teaching and Scheme of Examination:

No. of Weeks per Semester: **16 Weeks**

Subject	Instruction		Examination			
	Hours/Week	Hours/Semester	Marks			Duration
			Internal assessment	Board Examination	Total	
Communication English – I	5 Hours	80 Hours	25	75	100	3 Hours

**Topics and Allocation of Hours:**

SI. No.	Section	No. of Hours
1	Part - A: Grammar	28
2	Part - B: Composition/Comprehension	24
3	Part – C: Literature(Prose & Poetry)	12
4	Library	16
TOTAL		80

**\*\* For Library 16 hours (to prompt reading and facilitate self- learning)**

Library hours only in the **I SEMESTER**

**Part C: Literature (Prose & Poetry): No. of Hours: 12**

SI.No.	Prose
1.	Of Trains and Travellers
2.	Global Warming
3.	Books-Our Never Failing Friends
4.	A Sense Of The Future
	<b>Poetry</b>
1.	Ageless Tamil
2.	Hope
3.	Song of a Dream

## **RATIONALE**

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 and 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, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, grammatical ability, enhance writing skills, correspond with others and develop skills in reading and writing English.

## **SPECIFIC INSTRUCTIONAL OBJECTIVES**

Reading 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. They also tend to be 'afraid' of words and in turn they are not able to develop their personal vocabulary. In other words, without solid literacy skills, the student's prospects and life chances are limited. It is a fact that reading skill shapes one's personality.

### **READING SKILL**

The student is able to:

- 1.1 Understand the difficult words and phrases in the lesson
- 1.2 Use the words and phrases correctly in his own sentences
- 1.3 Read the lesson properly without mistakes
- 1.4 Read and comprehend the unseen passage correctly

### **WRITING SKILL**

The student is able to:

- 2.1 Write the answers correctly to the questions on the lessons
- 2.2 Write personal letters in the proper format without mistakes
- 2.3 Use words and phrases in his own sentences
- 2.4 Write grammatically correct sentences
- 2.5 Answer the questions on the dialogue
- 2.6 Answer the questions on the Visual
- 2.7 Develop the hints into a literal passage

### **PRACTICAL KNOWLEDGE OF GRAMMAR**

**The student is able to:**

- 3.1 Use verbs correctly
- 3.2 Use various phrases appropriately
- 3.3 Identify the parts of speech
- 3.4 Identify the functional units
- 3.5 Transform interrogative and exclamatory into Assertive sentence

- 3.6 Convert active voice into passive voice and impersonal passive voice
- 3.7 Frame questions, question tag and write short answers correctly
- 3.8 Use articles, prepositions conjunctions appropriately
- 3.9 Change infinitive into gerund and vice-versa
- 3.10 Coin new words by affixing
- 3.11 Construct sentences in different tenses

### **COMPREHENSION**

#### **The student is able to**

- 4.1 Read, comprehend the unseen passage and answer the given questions
- 4.2 Read, comprehend the dialogue and answer the given questions
- 4.3 Study the visual and answer the given questions

### **GRAMMAR**

#### **The student is able to understand and use the**

- 1. Parts of speech
- 2. Functional units
- 3. Active voice/Passive voice/Impersonal passive voice
- 4. Framing Questions
- 5. Question Tag
- 6. Infinitives and Gerunds
- 7. Articles
- 8. Affixation
- 9. Error correction
- 10. Tenses
- 11. Synonyms and Homophones

### **COMPOSITION**

- 1 Unseen Passage Comprehension
- 2 Dialogue Comprehension
- 3 Visual Comprehension
- 4 Personal Letter Writing (Uniform addresser and addressee to be given)
- 5 Rearrange the jumbled sentences in order
- 6 Hints Development.

### **LITERATURE**

- a. Four prose Lessons                      b. Three poems
- 1 Small passages from the prose text. Three out of four small questions to be answered
- 2 Five fill up the blanks from the prose text to be answered.
- 3 Small passages from the poems. Two out of three small questions to be answered

## LEARNING STRUCTURE

To enable the students to comprehend the meaning of new words, use grammar, to comprehend the unseen passages, pictures, visuals and dialogues and answer the questions in an error-free and simple language

PROCEDURE	TEACHING GRAMMAR	COMPOSITION	LITERATURE
PRINCIPLES	IDENTIFICATION OF VARIOUS ASPECTS OF ENGLISH GRAMMAR	EXPOSURE TO VARIOUS COMPREHENSION EXERCISES	TEXT BOOK OF PROSE LESSONS AND POEMS
CONCEPTS	CONCEPT OF TRANSFORMATION OF SENTENCES	UNDERSTANDING THE WRITTEN TEXT, DIAGRAMMATIC REPRESENTATIONS AND VISUALS, WRITING LETTERS	ENRICHING VOCABULARY BY VARIOUS MEANS
FACTS	PARTS OF SPEECH, WORDS , PHRASES, CLAUSES, SENTENCES, PASSAGES	SCOREBOARDS, NEWSPAPER REPORTS, VISUALS, DIAGRAMS	LEARNING VARIOUS TYPES OF TEXTS AND MESSAGES

**SYLLABUS**  
**COMMUNICATION ENGLISH - I**

**Content**

**PART - A (Non textual)**

**GRAMMAR:**

- 1) Parts of speech
- 2) Functional units(SVOCA)
- 3) Active to passive voice and impersonal passive voice
- 4) Framing questions (for the responses given)
- 5) Question tag
- 6) Infinitives and Gerunds
- 7) Articles
- 8) Affixation (Prefixes and suffixes)
- 9) Correction of errors
- 10) Prepositions
- 11) Conjunctions
- 12) Synonyms (Matching/Textual)
- 13) Tenses

**PART - B**

**COMPOSITION**

- 1 Unseen Passage Comprehension
- 2 Dialogue Comprehension
3. Visual Comprehension
- 4 Personal Letter Writing (Uniform addresser and addressee to be given)
- 5 Rearrange the jumbled sentences in order
- 6 Hints Development.

**PART - C**

**LITERATURE**

Sl.No.	Prose
1.	Of Trains and Travellers
2.	Global Warming
3.	Books-Our Never Failing Friends
4.	A Sense Of The Future
	<b>Poetry</b>
1.	Ageless Tamil
2.	Hope
3.	Song of a Dream

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**COMMUNICATION ENGLISH – I**  
**Model Question Paper-1**

Time : 3 hrs

Max Marks : 75

**PART – A**

(24 + 6=30)

**GRAMMAR**

12X2=24 marks

**Each question carries 2 marks**

**Last question No : 2 carries 6 marks**

**1) Answer any twelve of the following as directed:**

a) Identify the parts of speech of the underlined words:

a) The thirsty crow drank the water and flew away happily.

b) India is the biggest democracy in the world.

(b) Name the functional units of the underlined word / words:

(i) They laughed loudly.

(ii) Frame a sentence in SVO pattern

(c) (i) Change the following sentence into passive voice:

Rama eats an orange.

(ii) Change the following sentence into impersonal passive voice

Our teacher dictates an essay everyday.

(d) Frame one question each for the responses given:

(i) I have gone to Chennai.

(ii) He is studying in a Polytechnic college.

(e) Supply suitable question tag to the following sentences:

(i) The skeleton of an ape resembles that of a human

(ii) You are coming tomorrow.

(f) (i) Rewrite the sentence changing the infinitive into gerund

I like to learn French.

(ii) Rewrite the sentence changing the gerund into infinitive

I like eating apples.

(g) Rewrite the passage (s) filling the blanks with suitable articles:

(i) \_\_\_\_\_ fruit seller does not earn much during the rainy season.

(ii) He bought \_\_\_\_\_ umbrella yesterday.

(h) Form negative words using prefixes:

(i) lucky

(ii) responsible

- (i) Add suitable suffixes to the following words so as to change the part of speech:  
 (i) judge                      (ii) approve
- (j) Rewrite the following sentences, correcting the errors:  
 (i) The nature of things are always the same.  
 (ii) I congratulated him for his success.
- (k) Fill in the blanks with suitable prepositions from the given choice.  
 a. Rama is fond --- music (of/for)  
 b. Gopu is superior ---- Ramu (of/to)
- (l) Rewrite the sentences using the right conjunction from the given choice.  
 (i) The man is poor, honest. (but/and)  
 (ii) She must weep. She will die. (or/though)
- (m) Match the following words with their meanings (Textual)
- |                |            |
|----------------|------------|
| (i) Doom       | ancient    |
| (ii) Discard   | royal seat |
| (iii) Throne   | reject     |
| (iv) Primitive | ruin       |

**2) Write six sentences in six different tense forms using the subject and the verb given.**

(6marks)

'He'- subject      'draw' – verb

**PART B**

(6 X 5 = 30)

**a) Read the following passage carefully and answer the questions that follow: (5 Marks)**

Insects are small creatures having six legs, no backbone and a body divided into three parts. They are the most plentiful of all living creatures. Insects can be divided into two main kinds. Those insects which are useful to man and those insects which are harmful to him. There are also those which are merely interesting or beautiful.

Bees and silkworms are examples of useful insects. Bees collect honey and wax from flowers for our use. Silkworms supply us with fine, strong silk. These insects provide man with food and clothing.

Locusts and mosquitoes, on the other hand are harmful to man. Locusts will eat all growing plants and every year trees and crops are destroyed by these hungry creatures. Mosquitoes pass the dangerous disease of malaria from person to person and every year millions of people become ill and even die because of the activities of mosquitoes which are a great danger to health.

There are some insects which are not directly useful or harmful to man but are interesting and beautiful. Examples of such insects are colorful butterflies, pretty little ladybirds and fluttering moths.

**Questions :**

- a. Define insects.
- b. Give some examples of useful insects.
- c. Name some beautiful insects.
- d. Insects are always harmful to mankind. Say true or false
- e. Complete in your own words : Mosquitoes \_\_\_\_\_.

b) **Read the following dialogue carefully and answer the questions that follow:** (5 Marks)

Do not rewrite the Dialogue

- Sheela : Last week I went to Chennai  
Mala : whether to attend any function?  
Sheela : yes, to attend my friend's marriage  
Mala : your friend!  
Sheela : She studied with me in elementary school. You do not know her.  
Mala : You still remember your elementary school friends? Oh,God! You got such a tremendous memory and sense of remembrance.  
Sheela : Oh! thankyou.  
Mala : Fine, I don't have such a memory.

- 1) Name the speakers.
- 2) What is the relationship between the speakers?
- 3) What is the occasion discussed here?
- 4) Where did Sheela go last week?
- 5) Mention a characteristic of Sheela.

c) **Study the visual and answer the questions that follow** (5 Marks)



**Questions:**

- 1. Name the occasion for releasing the stamp.
- 2. Mention the year of the occasion.
- 3. What is the value of the stamp?
- 4. Identify the animal cartoonised here.
- 5. Identify a monument shown here.

**d) Imagine you are S.R Abi residing at 14, 1<sup>st</sup> Cross, T. Nagar, Chennai.**

D.Laxmi of Trichy is your friend.

(5 Marks)

(i) Write a letter to your friend describing a picnic spot you visited recently.

(or)

(ii) Invite your friend for your College Day function.

**e) Rearrange, the following jumbled sentences in order :**

(5 Marks)

- Finally, it is true that the influx of immigrants in our urban areas and stress in our society have hastened the spread of the use of drugs.
- At a still deeper level, young intelligent and often sensitive members of our society
- experiment in the hope of finding an alternative society.
- In recent years, drug-taking by young people has become a habit.
- It is a grim epidemic that requires the attention and help of every responsible citizen.
- At a somewhat deeper level, the habit many have started as a protest against authority.

**f) Develop the following hints into a passage:**

(5 Marks)

Students--not serious in studies--waste time--watching unwanted TV channels--moving to movie very often--accumulate the portions of study--at the time of examination--become serious--study day and night--become worried and tired--faint in the exam hall--fail in the exam--message.

## PART-C

(15 Marks)

### LITERATURE

**1) a) Answer any three of the following in one or two sentences each:**

(i) Books written by great men are invaluable gifts to mankind. It is humanly impossible to imagine the infinite variety of books that adorn the cupboards and shelves of libraries all over the world. Books like food and water have become essential requirements of modern civilized world.

Q : Name the third essential requirement of modern civilized world, mentioned here.

(ii) "All these facts lead scientists to infer that the global warming we now experience is not a natural occurrence and that it is not brought on by natural causes. Humanity's industrial emissions are responsible," they say.

Q : What, according to the scientists, are responsible for global warming?

(iii) "There is one other type of person who grips every body's attention the moment he enters a train"

Q : Mention three characteristics of the "other type of person".

(iv) "This is the sense of the future I want to talk about, at first hand, as a scientist"

Q : What is 'the sense of the future' according to the author?

**b) Fill up the blanks and rewrite:**

(5 X 1 = 5)

1. Melting ice caps reflect less sunlight than previously, so our planet absorbs more and more \_\_\_\_\_.
2. A great writer has classified books into two categories- Books of the Hour and Books of \_\_\_\_\_.
3. The contribution to English literature by Indian writers is also \_\_\_\_\_.
4. We owe that miracle to \_\_\_\_\_ and it is a miracle.
5. But the atomic bomb is only the \_\_\_\_\_ for our fears.

**c) Answer any two of the following in one or two sentences each:**

(2 X 2 = 4)

(i) We matured Tamils have lived, some say....

Q: What do some people say about the origin of the Tamils?

(ii) I am still alive, vibrant with life.

The black cloud will disappear,

Q: What makes one alive and vibrant?

(iii) To quench my longing I bent me low

By the streams of the spirits of Peace that flow

Q: What is her longing?

**COMMUNICATION ENGLISH – I**  
**Model Question Paper-2**

Time : 3 hrs

Max Marks : 75

**PART – A**  
**GRAMMAR**

(24 + 6=30)

12X2=24 marks

**Each question carries 2 marks**

**Last question No 2 carries 6 marks**

**I. 1) Answer any twelve of the following as directed:**

- (a) Identify the parts of speech of the underlined words:
- (i) India won the match.
  - (ii) The peacock danced beautifully.
- (b) Name the functional units of the underlined word / words:
- (i) He became the captain of the team.
  - (ii) Frame a sentence in SV IO DO pattern.
- (c) (i) Change the following sentence into passive voice:  
He presented me a gift.
- (ii) Change the following sentence into impersonal passive voice:  
My mother prepares delicious food.
- (d) Frame one question each for the responses given:
- (i) They want to play cricket.
  - (ii) We are celebrating our festival.
- (e) Supply suitable question tag to the following sentences and rewrite:
- (i) I am a good English teacher.
  - (ii) She is not ready for the exam.
- (f) (i) Rewrite the sentence changing the infinitive into gerund  
He likes to write novels.
- (ii) Rewrite the sentence changing the gerund into infinitive  
Exercising daily is a good habit.
- (g) Rewrite the passage filling the blanks with suitable articles:
- (i) Jupiter is the young world and \_\_\_\_\_ earth is the living world.
  - (ii) We want to build \_\_\_\_\_ house in an orchard.
- (h) Form negative words using prefixes:
- (i) doubtful
  - (ii) convenient

(i) Add suitable suffixes to the following words so as to change the part of speech:

(i) understand                      (ii) king

(j) Rewrite the following sentences correcting the errors:

i) Please bring one of the pencil.

ii) I prefer coffee than tea.

(k) Fill in the blanks with suitable prepositions from the given choice:

(i) Muhurtham takes place from 8a.m \_\_\_\_\_ 10a.m.(to, in).

(ii) I agree \_\_\_\_\_ his ideas. (to, with).

(l) Combine the sentence using the right conjunction from the given choice:

(i) I studied hard \_\_\_\_\_ got first rank. (and, but).

(ii) \_\_\_\_\_ I am suffering from fever I want leave. (but, as).

(m) Match the following words with their meanings (from the text)

i) successor            :            length in time

ii) glacier                :            ruling

iii) reigning            ;            moving mass of ice

iv) span                    :            follower

**2 ) Write six sentences in six different tense forms using the subject and verb given (6 marks)**

'They' –subject    'win' -verb

## PART B

### COMPOSITION / COMPREHENSION

(6 X 5 =30 marks)

**a) Read the following passage carefully and answer the questions that follow (5 marks)**

Somanathahalli, near Gulbarga in Karnataka, is a village which has over 300 abandoned houses, located on the banks of the Bhima. The village has several natural resources. Somanathahalli and other villages in the region have large reserves of limestone. The cement factories in nearby towns covet this resource. In addition, there is granite as well. The village itself, however, has seen no development. It has about 700 residents, but no school or primary health centre.

There are no bus services even.. So the only way to get to Somanathahalli is by 'tamtam', a modified auto rickshaw. If for any reason, the tamtam doesn't come, the only other option is to walk.

A tiger attack on two women in this village is said to have started the migration about six decades ago. A tiger entering a house is considered an ill-omen and the prevalent belief is that the house should be vacated. That's when the ghost stories started. Rumors of wandering spirits spread. Some said, "it's the devil haunting the village in the night." It terrified the people. A fortune teller suggested that the people should leave the village to "save themselves from the evil spirit".

**Questions:**

- 1) Where is Somanathahalli located?
- 2) Mention a reason for lack of development of Somanathahalli.
- 3) What is 'tamtam'?
- 4) Somanathahalli is an abandoned village. (state true or false)
- 5) Complete in your own words: A fortune teller -----

**b) Read the following dialogue carefully and answer the questions that follow: (5marks)**

Do not rewrite the dialogue:

At railway station enquiry counter.

- Passenger : Is there any train to Chennai?  
Clerk : Of course, there are many trains, at what time you mean?  
Passenger : Between 6.00 A.M and 10.00 A.M.,  
Clerk : There is one superfast and two passenger trains.  
Passenger : Fare, please?  
Clerk : Rs 85/- for superfast and Rs. 40/- for passenger trains.  
Passenger : Journey time in superfast?  
Clerk : 5 hours  
Passenger : Thank you sir.  
Clerk : Most welcome.

**Questions:**

1. Who are the persons involved in this conversation?
2. Where does the passenger want to go?
3. Where is the dialogue taking place?
4. How many trains are available to Chennai between 6 AM and 10 AM ?
5. What is the passenger train fare?

**c) Study the Visual and answer the questions that follow (5 Marks)**

Don't build your house near a stadium



**Questions:**

1. What is the warning given through the visual?
2. What has broken the glass panel?
3. Where is the house located?
4. Mention an item that is stained.
5. What has happened to one part of his spectacles?

**d). Imagine you are Mr. S. Ram of Trichy.**

Mr. S. Raghul, of 24, 11<sup>th</sup> Cross, Jevan Nagar, Madurai is your friend.

Invite him to attend your sister's marriage. (5 marks)

(or)

Describe a cricket match you witnessed recently. (5 marks)

**e) Rearrange the following jumbled sentences in order: (5 marks)**

- Then he stopped giving predictions.
- When his enemy caught him red-handed he tactfully escaped.
- Rajan, initially did not know anything about astrology.
- There was a tactful astrologer by name Rajan.
- By mere guesswork and psychology, he managed his business.

**f) Develop the following hints into a passage: (5 marks)**

Shersingh family – live in a forest – no road , transport and medical facility – his brother sick – shersingh – bravely carries him on his back- to a distant hospital – thus his brother – saved – proves that he is a dutiful brother

**PART-C**

**LITERATURE (15 Marks)**

**1) Answer any three of the following in one or two sentences each: (3x2=6marks)**

i) I have a weakness for odd trains, some shuttle or passenger which will crawl though the countryside and stop long enough at unknown stations.

Q : Why does the author prefer odd trains?

ii) Yet it is responsible for the conspicuous increase in storms, floods and raging forest fires we have seen in recent years, say scientists

Q : What is responsible for the storms, floods etc..?

iii) The teachers at school and the parents at home are required, to bestow utmost care and attention. They are duty-bound to fulfill their obligation.

Q : What is the obligation of the teachers and parents?

iv) Every machine has been a liberator.

Q : In what way has every machine been a liberator?

**b) Fill in the blanks and rewrite :** (5x1=5marks)

i) He may even claim to be the one who \_\_\_\_\_ the Janata Express

'Shatabdi Concession or the Hindusthan Coach, through his mysterious agencies in the proper quarters.

ii) He demands very little from others except a \_\_\_\_\_ which he will get anyway.

iii) But it is not just about how much the Earth is warming, it is also about how \_\_\_\_\_ it is warming.

iv) The books of All Time are \_\_\_\_\_

v) We are afraid of bombs because we have no faith in the \_\_\_\_\_.

**c) Answer any two of the following in one or two sentences each:** (2x2=4marks)

i) Countless frustrations have not cowed me.

Q : How does he withstand the countless frustrations?

ii) soul-deep in visions that poppy-like sprang;

Q : Mention any two visions the poetess had.

iii) Tamils provided culture and made the world glow

Q . Explain.

**ENGINEERING MATHEMATICS - I**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN ENGINEERING - SYLLABUS**

**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21002**

Semester : I Semester

Subject Title : **ENGINEERING MATHEMATICS - I**

**TRAINING AND SCHEME OF EXAMINATION:**

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
Engineering Mathematics - I	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**No. of Weeks per Semester: 16 Weeks**

**TOPICS AND ALLOCATION OF HOURS:**

Sl.No.	Topic	Time (Hrs.)
1	Determinants and Matrices	14
2.	Binomial Theorem and Partial Fraction	14
3.	Straight lines	14
4.	Trigonometry I	14
5.	Trigonometry II	14
	Tutorial	10
	Total	80

**Rationale:** This subject being a branch of “Logic” is classified as one of the basic sciences and intends to teach students, basic facts, concepts and principles of mathematics as a tool to analyse Engineering problems. Mathematics lay down foundation for understanding core technology subjects.

**Objectives:** This subject helps the students to develop logical thinking which is useful in Comprehending the principles of all other subjects. Analytical and systematic approach towards any problem is developed through learning of this subject. Mathematics being a versatile subject can be used at every stage of human life.

**LEARNING STRUCTURE:**

<b>Application</b>	To understand the techniques and methods for solving Engg. Problems such as simultaneous equation involved in vibrations, ckts. Laws of friction, projections, Lami's thorem, stress – strain curves etc. Work done moment of force about a point and line.				
<b>Procedure</b>	To explain use of properties of determinants to solve problems, use of cramer's rule, matrix inversion	Binomial Theorem for positive integral index and for rational index partial fraction of proper and improper fractions	To find distance of a point from a fixed line, distance between parallel lines, derivation of angle between two lines and pair of lines, parallel line and perpendicular line condition for two lines and pair of lines.	Using various techniques proving standard results which will be used in solving engineering problems.	Using various technique proving standard results which will be used in solving engineering problems.
<b>Concepts</b>	Cramer's rule, Applications of properties to solve problems, Cramer's rule, Algebra of matrices. Inverse of a matrix	Binomial Expansion for positive and negative integral index. Cases of finding partial fractions.	Angle between lines combined equation of two lines through origin and not through origin. Angle between pair of lines.	Trigonometrical ratios of allied angles compound angles and multiple angles.	Inverse Trigonometrical ratios.
<b>Facts</b>	Definition of determinants properties of determinants definition of matrix.	Definition of permutation and combination. Definition of polynomial fractions.	Combined equation of two lines.	Definition of Trigonometrical ratios, allied angles, compound angles and multiple angles.	Definition of inverse Trigonometric functions.

## DETAILED SYLLABUS

### CONTENTS

UNIT	NAME OF TOPICS	Hours	Mark
I	<b>DETERMINANTS</b> 1.1 Definition and expansion of determinants of order 2 and 3. Properties of determinants. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns- Simple Problems	5	7
	1.2 Problems involving properties of Determinants	4	7
	<b>MATRICES</b> 1.3 Definition of matrix. Types of matrices. Algebra of matrices such as equality, addition, subtraction, scalar multiplication and multiplication of matrices. Transpose a matrix, Adjoint matrix and Inverse matrix. Simple Problems	5	8
II	<b>BINOMIAL THEOREM</b> 2.1 Definition of factorial notation, definition of permutation and combinations with formula. Binomial theorem for positive integral index (statement only), finding of general and middle terms. Simple Problems	5	8
	2.2 Problems finding coefficient of $x^n$ , independent terms. Simple Problems. Binomial Theorem for rational index, expansions only upto -3 for negative integers. Simple Expansions.	4	7
	<b>PARTIAL FRACTIONS</b> 2.3 Definition of Polynomial fraction, proper and improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. Simple Problems.	5	7
III	<b>STRAIGHT LINES</b> 3.1 Length of perpendicular distance from a point to the line and perpendicular distance between parallel lines. Simple Problems Angle between two straight lines and condition for parallel and perpendicular lines. Simple Problems	4	7
	<b>PAIR OF STRAIGHT LINES THROUGH ORIGIN</b> 3.2 Pair of lines passing through the origin $ax^2+2hxy+by^2=0$ expressed in the form $(y-m_1x)(y-m_2x)=0$ . Derivation of $\tan\theta = \pm \frac{2\sqrt{h^2-ab}}{a+b}$ , condition of parallel and perpendicular lines. Simple Problems	5	8

UNIT	NAME OF TOPICS	Hours	Mark
III	<b>PAIR OF STRAIGHT LINES NOT THROUGH ORIGIN</b> 3.3 Condition for General equation of the second degree $ax^2+2hxy+by^2+2gx+2fy+c=0$ to represent pair of lines. $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$ (statement only) Angle between them, condition for parallel and perpendicular lines. Simple Problems	5	7
IV	<b>TRIGONOMETRY-I</b> 4.1 Trigonometrical ratios of allied angles. Expansion of $\sin(A \pm B)$ and $\cos(A \pm B)$ . Problems using above expansion.	5	8
	4.2 Expansion of $\tan(A \pm B)$ and problems using this expansion	4	7
	4.3 Trigonometrical ratios of multiple angles (2A only) and sub multiple angles. Simple Problems.	5	7
V	<b>TRIGNOMETRY-II</b> 5.1 Trigonometrical ratios of multiple angels (3A only). Simple Problems	4	8
	5.2 Sum and product formulae. Simple Problems	5	7
	5.3 Definition of inverse trigonometric ratios relation between inverse trigonometric ratios. Simple Problems	5	7

**Text Book:**

Mathematics for Higher Secondary – I year and II year (Tamil nadu Text Book Corporation)

**Reference Book:**

Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai

Engineering Mathematics – Dr.P.Kandasamy & Others, S.Chand & Co Ltd, New Delhi

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**MODEL QUESTION PAPER – 1**  
**ENGINEERING MATHEMATICS – I**

**Time : 3Hrs**

**PART – A**

**Max Marks:75**

**I. Answer Any 15 Questions**

**15x1=15**

1. Solve :  $\begin{vmatrix} x & x \\ 3 & 2x \end{vmatrix} = 0$

2. Find the value of  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ b+c & c+a & a+b \end{vmatrix} = 0$

3. If  $A = \begin{pmatrix} 1 & 4 \\ 1 & 0 \end{pmatrix}$ ,  $B = \begin{pmatrix} 4 & 5 \\ 7 & -2 \end{pmatrix}$  Find AB

4. Find the adjoint matrix of  $\begin{pmatrix} 3 & -4 \\ 1 & 2 \end{pmatrix}$

5. Find the value of  ${}^{10}C_7$

6. Find the general term of  $(3x - y)^8$

7. Expand  $(1+x)^{-3}$  up to three terms when  $|x| < 1$

8. Split  $\frac{x+1}{x(x+1)}$  into partial fraction without finding the constant
9. Find the value of 'm' if the lines  $2x+my=4$  and  $x+5y-6=0$  are perpendicular.
10. Find the combined the equation of the lines  $2x+5y=0$  and  $x+3y=0$ .
11. Show that the pair of lines  $x^2 - 8y + 16y^2 = 0$  are parallel
12. Write down the condition for the equation  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  to represent a pair of straight lines.
13. Show that  $\sin(-330)^\circ \times \sin 420^\circ = \frac{\sqrt{3}}{4}$
14. Find the value of  $\cos 50^\circ \cos 40^\circ - \sin 50^\circ \sin 40^\circ$
15. If  $\tan A = \frac{1}{2}$   $\tan B = \frac{1}{3}$  Find  $\tan(A+B)$
16. Find the value of  $2 \sin 75^\circ \cos 75^\circ$
17. If  $\sin \theta = \frac{1}{3}$ , find the value of  $\sin 3\theta$
18. Find the value of  $4\cos^3 10^\circ - 3\cos 10^\circ$
19. Show that  $\frac{\sin 2A - \sin 2B}{\cos 2A - \cos 2B} = -\cot(A+B)$

20. Show that  $\tan^{-1} \frac{2x}{1-x^2} = 2\tan^{-1}x$

**PART – B**

**(Answer Any two subdivision in each question )**

**5x12=60**

*All Questions carry Equal Marks*

21 a. Solve by using Cramer's Rule :

$x+y+z=3,$       $2x-y+z=2$      and  $3x+2y-2z=3$

b. Show that  $\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+x \end{vmatrix} = x^2(x+3)$

c. Find the inverse of  $\begin{pmatrix} 3 & -2 & 1 \\ -4 & 1 & -1 \\ 2 & 0 & 1 \end{pmatrix}$

22. a Find the middle terms in the expansion of  $\left(x^3 + \frac{2}{x^3}\right)^{11}$

b. Find the term independent of x in the expansion of  $(2x^2+1/x)^{12}$

c. Resolve  $\frac{x-3}{x(x+5)(x-6)}$  in to partial fraction

23. a Find the angle between the lines  $7x+2y=1$  and  $x-5y=0$

b. Find the separate equation of the pair of straight lines  $9x^2+12xy+4y^2=0$ . Also prove that the lines are parallel.

c. Show that the equations represented by

$$2x^2 - 7xy + 3y^2 + 5x - 5y + 2 = 0 \text{ is a pair of straight lines}$$

24. a If  $\sin A = \frac{1}{\sqrt{10}}$  and  $\sin B = \frac{1}{\sqrt{5}}$  prove that  $A+B = \frac{\pi}{4}$

b. If  $A+B = 45^\circ$  prove that  $(1+\tan A)(1+\tan B) = 2$  and hence deduce the value of  $\tan 22\frac{1}{2}$

c. Prove that  $\frac{\sin 2A + \sin A}{1 + \cos 2A + \cos A} = \tan A$

25. a Prove that  $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$

b. Prove that  $(\cos\alpha - \cos\theta\beta)^2 + (\sin\alpha - \sin\theta\beta)^2 = 4 \sin^2 \left\{ \frac{\alpha - \beta}{2} \right\}$

c. Show that  $\tan^{-1} \left\{ \frac{x-y}{1+xy} \right\} = \tan^{-1} x + \tan^{-1} y$

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**MODEL QUESTION PAPER – 2**  
**ENGINEERING MATHEMATICS – I**

**Time : 3Hrs**

**PART – A**

**Max Marks:75**

I. **Answer Any 15 Questions**

15x1=15

1. Find x if  $\begin{vmatrix} x-2 & 0 \\ 0 & x-2 \end{vmatrix} = 0$

2. Prove that  $\begin{vmatrix} x & 2x & 3x \\ 4x & 5x & 6x \\ 7x & 8x & 9x \end{vmatrix} = 0$

3. If  $A = \begin{pmatrix} 3 & 4 \\ -2 & -1 \end{pmatrix}$  Find  $A^2$

4. Find the inverse of  $\begin{pmatrix} 1 & -1 \\ -2 & 0 \end{pmatrix}$

5. Find the 11<sup>th</sup> term of  $\left(3x^2 + \frac{1}{x}\right)^{20}$

6. How many middle terms are in the expansion of  $(5x-y)^9$

7. Write the first three terms in the expansion of  $(1-x)^{-2}$
8. Without finding the constants split  $\frac{x^3 - 3}{(x + 2)(x^2 + 1)}$  in to partial fraction.
9. Find the perpendicular distances from the point (2,1) to the straight line  $3x+2y+1=0$ .
10. Write down the condition for the pair of lines given by  $ax^2+2hxy+by^2=0$  to be parallel.
11. Find 'a' if the lines represented by  $3x^2+4xy+ay^2=0$  are perpendicular
12. State the expression for angle between pair of line given by  $ax^2+2hxy+by^2+2gx+2fy+c=0$
13. Find the value  $\sin 15^\circ$  without using tables or calculator.
14. Find the value of  $\cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ$
15. Simplify  $\frac{\tan 22 + \tan 23}{1 - \tan 22 \tan 23}$
16. Prove that  $\frac{\sin 2A}{1 + \cos 2A} = \tan A$
17. Find the value of  $3\sin 10^\circ - 4 \sin^3 10^\circ$

18. If  $\cos A = \frac{3}{5}$  find the value of  $\cos 3A$ .

19. Show that  $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ = 0$ .

20. Show that  $\sin^{-1} \frac{2x}{1+x^2} = 2 \tan^{-1} x$ .

**PART – B**

**(Answer any two subdivision in each Question)**

**5x12=60**

*All Questions carry Equal Marks*

21.a) Solve the equations  $4x+y+z=6$ ,  $2x-y-2z=-6$  and  $x+y+z=3$ , using Cramer's rule

b) Prove that 
$$\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = x^2(x+a+b+c)$$

c) If  $A = \begin{pmatrix} 3 & -5 \\ -4 & 2 \end{pmatrix}$  show that  $A^2 - 5A - 14I = 0$

22. a Find the middle terms in the expansion of  $(2x+1/x)^{13}$

b. Find the term independent of 'x' in the expansion of  $\left(2x^2 - \frac{1}{x}\right)^{12}$

c. Resolve  $\frac{7x-4}{(x+2)(x-1)^2}$  in to a partial function.

23. a Derive the expression for angle between two lines  $y=m_1x+c_1$  and  $y=m_2x+c_2$

- b. If the slope of one of the straight lines  $ax^2 + 2hxy + by^2 = 0$  is twice that of the other. Show that  $8h^2=9ab$ .
- c. Find the value of ' $\lambda$ ' so that the equation  $3x^2+14xy+8y^2-8x-2y+\lambda=0$  represents a pair of straight lines.
24. a. If  $\sin A = \frac{3}{5}$ ,  $\cos B = \frac{12}{13}$ , find the values of  $\sin (A-B)$  and  $\cos (A-B)$
- b. If  $A+B=45^\circ$  Prove that  $(\cot A-1)(\cot B-1)=2$ . Also find the value of  $\cot 2A$
- c. Show that  $\frac{1+\sin \theta-\cos \theta}{1+\sin \theta+\cos \theta} = \tan \frac{\theta}{2}$
25. a. Prove that  $\frac{\cos^3 A - \cos 3A}{\cos A} + \frac{\sin^3 A + \sin 3A}{\sin A} = 3$
- b. If  $a=\sin A+\sin B$ ,  $B=\cos A+\cos B$ , Show that  $\tan^2 \frac{A-B}{2} = \frac{4-(a^2+b^2)}{a^2+b^2}$
- c. Show that  $\tan^{-1} \frac{3x-x^3}{1-3x^2} = 3\tan^{-1}x$

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**ENGINEERING MATHEMATICS - II**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21003**

Semester : I Semester

Subject Title : **ENGINEERING MATHEMATICS – II**

**TRAINING AND SCHEME OF EXAMINATION:**

**No. of Weeks per Semester: 16 Weeks**

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
Engineering Mathematics - II	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**TOPICS AND ALLOCATION OF HOURS:**

Sl.No.	Topic	Time (Hrs.)
1	Circles	14
2.	Family of Circles. Functions and Limits.	14
3.	Differentiation methods	14
4.	Application of Differentiation – I	14
5.	Application of Differentiation – II	14
	Tutorial	10
	Total	80

**Rationale:** The basic idea of Engineering is to develop new technologies for the effective use of materials and to produce maximum outputs thereby attain maximum profit. Differentiation is one of the major tools in the mathematics used in all fields of Engineering with these basic ideas of utilizing minimum resource and attaining maximum profit

**Objectives:** The student will be able to acquire knowledge of differentiation, principles and different methods, develop the ability to apply these methods to solve technical problems to execute management plans with precision.

## LEARNING STRUCTURE:

<b>Application</b>	Use of derivatives in the field of Geometry to find slopes of tangents and normal in the field of physics in finding velocity and acceleration and in the field of engineering to find maxima and minima				
<b>Procedure</b>	To explain usage equation of circle, length of tangent to find location of a point with respect to a circle, equation of tangent to the circle.	To explain the usage of concentric and orthogonal circles. To explain the usage of limits. To find differentiation of functions.	To explain the usage of derivatives of standard functions and different methods of differentiations .	To explain the usage of derivative in finding rate measure, velocity and acceleration equations of tangent and normal.	To explain the usage of differentiation in finding maximum and minimum. To explain the method of finding partial derivatives.
<b>Concepts</b>	Different forms of equation of circles length and equation of tangent.	Equation of concentric and orthogonal circles Differentiation of functions.	Derivations of standard functions. Different methods of differentiation.	Usage of derivative in rate measure, velocity and acceleration finding tangents to a curve.	Usage of differentiation in finding maximum and minimum Partial differentiation for more than one variable Euler's Theorem.
<b>Facts</b>	Circle, centre and radius	Definition of limit. Meaning of $\lim x \rightarrow a$ . Definition of Differentiation.	Definition of Differentiation Order of Derivative	Derivate as rate measure and slope of tangents.	Definition of increasing and decreasing function. Definition of partial differentiation.

## DETAILED SYLLABUS

### CONTENTS

UNITS	NAME OF TOPICS	Hours	Marks
I	<b>CIRCLES</b> 1.1 Equation of circle – given centre and radius. General Equation of circle – finding centre and radius. Simple Problems	5	8
	<b>1.2</b> Equation of circle through three non collinear points – Concyclic points. Equation of circle on the line joining the points $(x_1, y_1)$ and $(x_2, y_2)$ as diameter. Simple Problems	4	7
	<b>1.3</b> Length of tangent position of a point with respect to a circle, Equation of tangent. Simple Problems	5	7
II	<b>FAMILY OF CIRCLES</b> 2.1 Concentric circles – Contact of circles (internal and external) Orthogonal circles – Condition for Orthogonal circles (result only). Simple Problems	5	7
	<b>LIMITS :</b> 2.2. Definition of Limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ , $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$ $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} = 1$ ( $\theta$ in radian) (results only) problems using the above results.	4	7
	<b>DIFFERENTIATION:</b> 2.3. Definition – Differentiation of $x^n$ , $\sin x$ , $\cos x$ , $\tan x$ , $\cot x$ , $\sec x$ , $\operatorname{cosec} x$ , $\log x$ , $e^x$ , $u \pm v$ , $uv$ , $uvw$ , $u/v$ (results only) .Simple problems using the above results.	5	8
III	<b>DIFFERENTIATION METHODS:</b> 3.1. Differentiation of function functions and implicit functions. Simple Problems	4	7
	3.2. Differentiation of Inverse Trigonometric functions and parametric functions. Simple Problems	5	7
	3.3. Successive differentiation upto second order (parametric form not included). Definition of differential equation, formation of differential equation. Simple Problems	5	8
IV	<b>APPLICATION OF DIFFERENTIATION – I</b> 4.1. Derivative as rate measure. Simple Problems	4	7
	4.2 - Velocity and acceleration. Simple Problems	5	7
	4.3. Tangents and Normals. Simple Problems	5	8
V	<b>APPLICATION OF DIFFERENTIATION – II</b> 5.1 Definition of Increasing function, Decreasing function and turning points. Maxima and Minima (for single variable only)- Simple Problems	5	7
	<b>PARTIAL DIFFERENTIATION :</b> 5.2. Partial differentiation of two variable upto second orders only. Simple Problems	5	8
	5.3. Definition of Homogeneous functions – Euler’s Theorem. Simple Problems	4	7

**Text Book:**

Mathematics for Higher Secondary – I year and II year (Tamil nadu Text Book Corporation)

**Reference Book:**

Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai

Engineering Mathematics – Dr.P.Kandasamy & Others, S.Chand & Co Ltd, New Delhi

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**MODEL QUESTION PAPER - 1**  
**ENGINEERING MATHEMATICS - II**

Time : 3 Hours

Max. Marks:75

**PART - A**

**Answer any 15 Questions:**

15 x 1 = 15

- 1) Find the centre and radius of the circle  $x^2 + y^2 + 4x - 2y + 3 = 0$
- 2) Find the equation of the circle with centre (-2, -4) and radius 5 Units.
- 3) Write down the equation of the circle with end points of a diameter  $(x_1, y_1)$  and  $(x_2, y_2)$
- 4) Show that the point (5, -12) lies outside the circle  $x^2 + y^2 - 2x + 2y - 60 = 0$
- 5) State the condition for two circles to cut orthogonally
  
- 6) Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 2x}{3x}$
- 7) Find  $\frac{d}{dx} \left\{ \frac{1}{x^3} + 7\cos x \right\}$
- 8) Find  $\frac{d}{dx} \left\{ x^4 \tan x \right\}$
- 9) Find  $\frac{d}{dx} [\cos (\log x)]$
- 10) Find  $\frac{d}{dx} [\sin^{-1} (\sqrt{x})]$
- 11) Find  $\frac{d^2 y}{dx^2}$  if  $y = \tan x$
- 12) Find the differential equation by eliminating constant  $r$ , from  $x^2 + y^2 = r^2$
- 13) If  $A = x^2$  and  $\frac{dx}{dt} = 2$  find  $\frac{dA}{dt}$  when  $x = 5$
- 14) If the distance  $s$  given by  $s = 3t^2 + 5t + 7$ , find the velocity when  $t = 3$  seconds.
- 15) Find the slope the tangent to the curve  $y = x^2 - 5x + 2$  at the point (1, -2).
- 16) Find the slope of normal to the curve  $y = \sqrt{x}$  at (4, -2).
- 17) Show that the function  $y = 4x - x^2 + 7$  is the maximum at  $x = 2$ .
- 18) If  $u = x^3 + 5x^2y + y^3$  find  $\frac{\partial u}{\partial x}$ ,  $\frac{\partial u}{\partial y}$
- 19) If  $u = \log(x^2 + y^2)$  find  $\frac{\partial u}{\partial x}$
- 20) State Euler's Theorem.

**PART - B**

Answer any TWO subdivisions in each question:

12 = 60

All Questions carry Equal Marks

21 a) Find the equation of the circle passing through the point (-9,1) and having centre at (2,5)

b) Find the equation of the circle passing through the points (0,1),(2,3)and (-2,5)

c) Find the equation of the tangent at (5, -2) to the circle  $x^2 + y^2 - 10x - 14y - 7 = 0$

22.a) Show that the circles  $x^2 + y^2 - 4x + 6y + 8 = 0$  and  $x^2 + y^2 - 10x - 6y + 14 = 0$  touch each other.

b) Evaluate  $\lim_{x \rightarrow 3} \frac{x^5 - 243}{x^3 - 27}$

c) Differentiate the following:-

(i)  $y = e^x \log x \sin x$ , (ii)  $y = \frac{x^2 + \sin x}{x - \cos x}$

23.a) Find  $\frac{dy}{dx}$  if (i)  $y = \log(\sec x + \tan x)$  (ii)  $ax^2 + 2hxy + by^2 = 0$

b) Find  $\frac{dy}{dx}$  if (i)  $y = \cos^{-1} \frac{1-x^2}{1+x^2}$  (ii)  $x = a(t + \cos t)$ ,  $y = a(1 + \sin t)$

c) If  $y = x^2 \cos x$ , prove that  $x^2 y_2 - 4xy_1 + (x^2 + 6)y = 0$

24.a) The radius of a sphere is increasing at the rate of 1cm/sec. How fast the volume will be increasing when the radius is 4cm

b) A missile is fired from the ground level rises x meters vertically upwards

in time 3 seconds and  $x = 100t - \frac{25}{2} t^2$ . Find the initial velocity and maximum height of the missile

c) Find the equation of the tangent and normal to the curve  $y = x^2 - x + 1$  at (2,3).

25.a) Find the maximum and minimum values of  $2x^3 - 15x^2 + 36x + 18$

b) If  $u = x^3 - 2x^2y + 3xy^2 + y^3$ , Find  $\frac{\partial^2 u}{\partial x^2}$  and  $\frac{\partial^2 u}{\partial y^2}$

c) If  $u = \frac{x^3 - y^3}{x+y}$  prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2u$

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**MODEL QUESTION PAPER - 2**  
**ENGINEERING MATHEMATICS - II**

Time: 3 Hours

Max. Marks: 75

PART - A

**Answer any 15 Questions:**

15 x 1 = 15

- 1) Find the equation of the circle with centre (2,0) and radius 10 units.
- 2) Find the centre and radius of the circle  $x^2 + y^2 = 4$
- 3) Find the equation of the circle with the points (1, -1) and (2, 2) joining as diameter.
- 4) Find the length of tangent from the point (5,7) to the circle  $x^2 + y^2 - 6x + 10y - 11 = 0$ .
- 5) Show that this circles  $x^2 + y^2 - 10x + 4y - 13 = 0$  and  $x^2 + y^2 - 10x + 4y - 19 = 0$  are concentric circles.
- 6) Evaluate  $\lim_{x \rightarrow 3} \frac{x^3 - 3^3}{x - 3}$
- 7) Find  $\frac{dy}{dx}$  if  $y = \frac{1}{x^2} + \frac{2}{x} + \frac{3}{2}$
- 8) Find  $\frac{dy}{dx}$  if  $y = e^x \log x$
- 9) Find  $\frac{dy}{dx}$  if  $y = \cos^4 x$
- 10) Find  $\frac{dy}{dx}$  if  $y = \tan^{-1}(x^2)$
- 11) Find  $\frac{d^2y}{dx^2}$  if  $y = \sin(2x)$
- 12) Find the differential equation by eliminating the constants from  $y = ax^2 + b$
- 13) If  $V = a^3$  and  $\frac{da}{dt} = 1$ , find  $\frac{dV}{dt}$  when  $a = 5$
- 14) if  $S = ae^t + be^{-t}$ , Show that acceleration is always equal to distance
- 15) If the distance time formula is given by  $s = 2t^3 - 5t^2 + 7t - 4$ , find the initial velocity.
- 16) Find the slope of the normal to the curve  $y = x^2 + 7x$  at (1,8)
- 17) Find the minimum value of  $y = x^2 + 4x + 1$
- 18) If  $u = x^3 + x^2y + 2xy^2 - y^3$  find  $\frac{\partial u}{\partial y}$
- 19) If  $u = \tan(ax + by)$  find  $\frac{\partial u}{\partial y}$
- 20) Show that  $\frac{x^2 + y^2}{x - y}$  is homogeneous. State the order of the function.

**PART - B**

**Answer any TWO sub division from each Question:-**

5 x 12 = 60

*All Questions carry Equal Marks*

- 21.a) Find the equation of the circle, two of whose diameters are  $x + y = 6$  and  $x + 2y = 4$  and whose radius is 10 Units.
- b) Find the equation of the circle passing through (0, 1) and (4, 3) and having its centre on the line  $4x - 5y - 5 = 0$
- c) Find the equation of the tangent at (4, 1) on the circle  $x^2 + y^2 - 2x + 6y - 15 = 0$
- 22 a) Find the equation of the circle which passes through the origin and cuts Orthogonally with circles  $x^2 + y^2 - 8y + 12 = 0$  and  $x^2 + y^2 - 4x - 6y - 3 = 0$
- b) Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 10x}{\sin 7x}$
- c) Find  $\frac{dy}{dx}$  if (i)  $y = \frac{a}{x^2} + \frac{b}{x^3} + \frac{c}{x}$   
(ii)  $y = (x^2 - 5) \cos x \log x$
- 23.a) Find  $\frac{dy}{dx}$  if (i)  $y = \sin(e^x \log x)$  (ii)  $x^3 + y^3 = 3axy$
- b) Find  $\frac{dy}{dx}$  if (i)  $y = \tan^{-1} \frac{2x}{1-x^2}$  (ii)  $x = at^2, y = 2at$
- c) If  $y = a \cos(\log x) + b \sin(\log x)$  prove that  $x^2 y_2 + xy_1 + y = 0$
- 24.a) The base radius and height of a conical funnel are 4cm and 20cm respectively. Water is running out of the funnel at 2cc/sec. Find the rate at which the level of water is decreasing when the level is 10cm.
- b) If the distance time formula is given by  $s = 2t^3 - 15t^2 + 36t + 7$ , find the time when the velocity becomes zero.
- c) Find the equation of the tangent and normal to the curve  $y = 6 + x - x^2$  at (2, 4)
- 25a) Find the maximum and minimum value of  $y = 4x^3 - 18x^2 + 24x - 7$ .
- b) If  $u = \log(x^2 + y^2)$  find  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ .
- c) If  $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$  show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$

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# **ENGINEERING PHYSICS - I**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**L-SCHEME**  
**(Implements from the Academic year 2011-2012 onwards)**

Course Name : All branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV  
 Subject Code : **21004**  
 Semester : I Semester  
 Subject Title : **ENGINEERING PHYSICS - I**

**TEACHING AND SCHEME OF EXAMINATION:**

**No of weeks per semester: 16 weeks**

Subject	Instructions		Examination			Duration
	Hours /Week	Hours /Semester	Marks			
ENGINEERING PHYSICS-I	5 Hrs	80 Hrs	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**Topics and Allocation of Hours:**

Sl.No.	Topic	Time(Hrs)
1.	S I UNITS AND STATICS	16
2.	PROPERTIES OF MATTER	16
3.	DYNAMICS – I	16
4.	DYNAMICS – II	16
5.	SOUND AND MAGNETISM	16
<b>Total</b>		<b>80</b>

**RATIONALE:**

The exponential growth of Engineering and Technology has benefited the mankind with extreme sophistication and comfort. To sustain this development, continuous research and development should take place not only in Engineering and Technology but also in Basic Science such as Physics.

The various divisions of Physics like Optics, Acoustics, Dynamics, Semiconductor Physics, Surface Physics, Nuclear Physics, Energy Studies, Materials Science, etc provide the Foundation by enlightening the **Fundamental facts, Principles, Laws and Correct sequence of events** to develop the Engineering and Technology field for the prosperity of human beings.

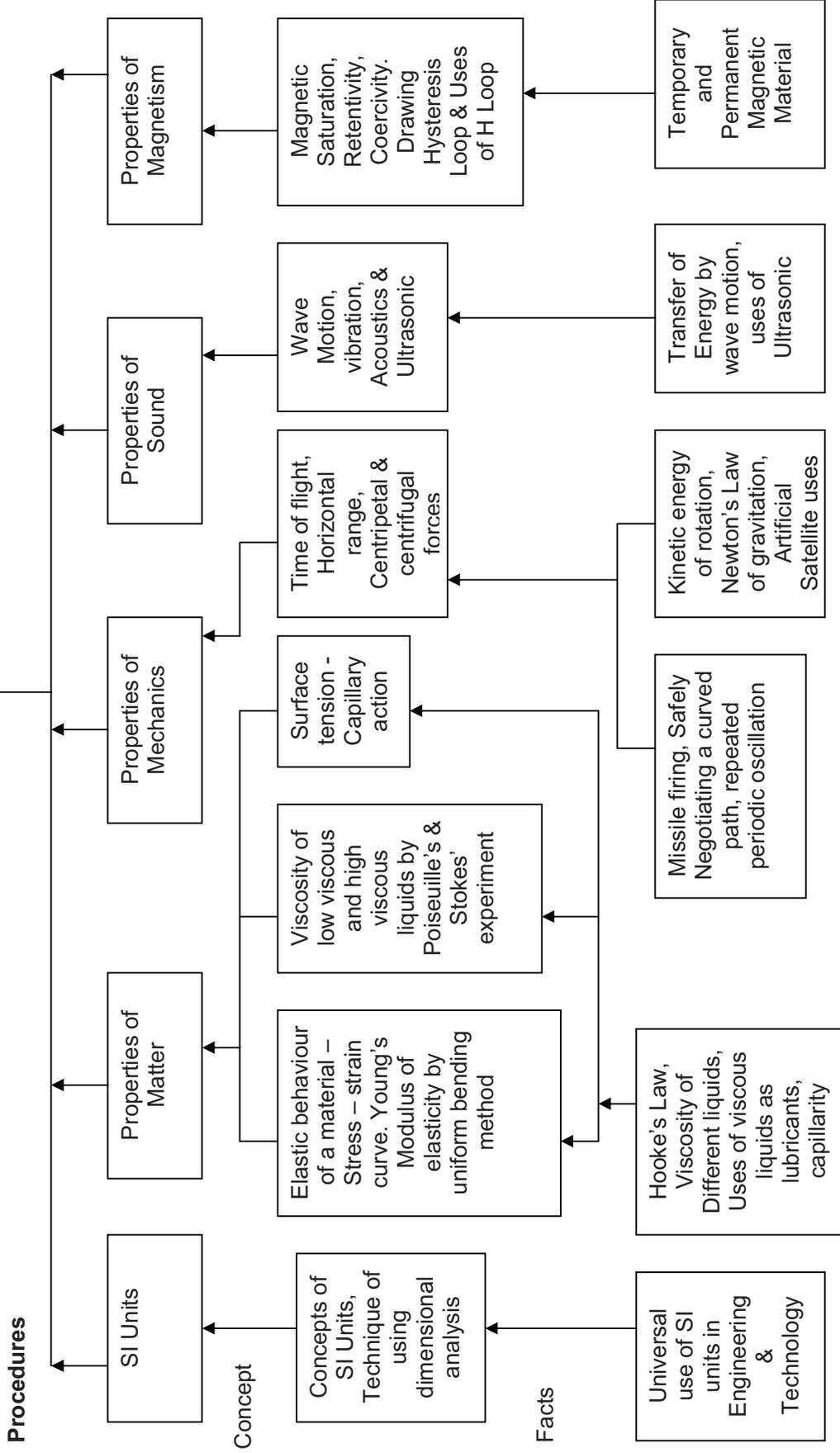
## **OBJECTIVES:**

At the end of the study of I Semester the student will be able to

- Understand the importance of SI units and dimensional formulas.
- Acquire broad ideas about resultant, moment of a force and torque of a couple.
- Understand the elastic property and the types of modules of elasticity.
- Explain the surface tension of liquids and viscosity of fluids.
- Acquire knowledge about projectile motion, circular motion and its application.
- Understand the concepts of simple harmonic motion.
- Gain knowledge about rotational kinetic energy and angular momentum.
- Acquire broader ideas about variation of acceleration with respect to height and its importance in launching satellites and concept of weightlessness.
- Understand the propagation of sound, ultrasonic and acoustics of buildings.
- Explain the importance of hysteresis of magnetic materials and its uses.
- Solve simple problems involving expressions derived in all the above topics.

**Learning Structure:**  
Applications

Enable to understand principles, laws, facts, concepts, mathematical derivation and experimental determination of values of different physical properties of materials by studying physics and to apply the acquired knowledge and skill to identify, interpret and analyse various practical field problems in different fields of engineering





Unit	Name of the Topic	Hours	Marks
II	<p><b>2.2 VISCOSITY</b>  Viscosity – Definition - Coefficient of viscosity - Definition, SI unit and dimensional formula - Stream line flow, turbulent flow-Explanation - Critical velocity –Definition- Reynolds number - Derivation of Poiseuille’s formula by dimensional method- Experimental determination of coefficient of viscosity of a low viscous liquid by capillary flow method using graduated burette (Variable pressure head method)– Terminal velocity – Definition - Experimental determination of coefficient of viscosity of a high viscous liquid by Stokes’ method – Practical applications of viscosity.</p>	<b>6 Hrs</b>	
	<p><b>2.3 SURFACE TENSION</b>  Surface tension &amp; angle of contact- Definitions - Explanation for capillary rise and dip - Expression for surface tension of a liquid by capillary rise method - Experimental determination of surface tension of water by capillary rise method – Practical applications of capillarity.Simple problems based on expression for surface tension.</p>	<b>4 Hrs</b>	
III	<b>DYNAMICS – I</b>		<b>15</b>
	<p><b>3.1. PROJECTILE MOTION</b>  Projectile motion, angle of projection, trajectory, maximum height, time of flight, and horizontal range – Definitions - Expressions for maximum height, time of flight and horizontal range – Condition for getting the maximum range of the projectile- Derivation of the equation to show that the trajectory of the projectile is a parabola.  Simple problems based on expressions for maximum height, time of flight and horizontal range.</p>	<b>5 Hrs</b>	
	<p><b>3.2 CIRCULAR MOTION</b>  Circular motion, angular velocity, period and frequency of revolutions– Definitions – Relation between linear velocity and angular velocity – Relation between angular velocity, period and frequency – Normal acceleration, centripetal force and centrifugal force – Definitions – Expressions for normal acceleration and centripetal force. Simple problems based on expression for centripetal force.</p>	<b>5 Hrs</b>	
	<p><b>3.3 APPLICATION OF CIRCULAR MOTION</b>  Banking of curved paths – Angle of banking – Definition – Expression for the angle of banking of a curved path. { <math>\tan \theta = v^2 / (r g)</math> }  Simple problems based on expression for angle of banking.</p>	<b>3 Hrs</b>	

Unit	Name of the Topic	Hours	Marks
III	<b>3.4 SIMPLE HARMONIC MOTION</b> Simple harmonic motion, amplitude, frequency, period and phase - Definitions – Simple harmonic motion as a projection of a uniform circular motion on any diameter.	3 Hrs	
IV	<p style="text-align: center;"><b>DYNAMICS – II</b></p> <b>4.1 ROTATIONAL MOTION OF RIGID BODIES</b> Rigid body – Definition - Moment of inertia of a particle about an axis, moment of inertia of a rigid body about an axis – expressions – Radius of gyration – Definition – Expression for the kinetic energy of a rotating rigid body about an axis – Angular momentum – Definition – Expression for the angular momentum of a rotating rigid body about an axis – Law of conservation of angular momentum – Examples.	7 Hrs	15
	<b>4.2 GRAVITATION</b> Newton’s laws of gravitation – Acceleration due to gravity on the surface of earth –Difference between mass and weight of a body – Expression for variation of acceleration due to gravity with altitude – Concept of weightlessness.	4 Hrs	
	<b>4.3 SATELLITES</b> Satellites – Natural and artificial – Escape velocity and orbital velocity – Definitions – Expression for escape velocity – Expressions for orbital velocity and period of revolution of a satellite around earth – Geo-stationary and polar satellites – Uses of artificial satellites. Simple problems based on expressions for escape velocity, orbital velocity and period of revolution.	5 Hrs	
V	<p style="text-align: center;"><b>SOUND AND MAGNETISM</b></p> <b>5.1 SOUND</b> Wave motion – Introduction and definition – Progressive waves, longitudinal and transverse waves – Examples and comparison –Amplitude, wave length, period and frequency of a wave – Definitions - Relation between wavelength, frequency and velocity of a wave - Stationary or standing waves.	10 Hrs	15
	Vibrations - Free & forced vibrations and resonance – definitions and examples –Laws of transverse vibrations of a stretched string – Sonometer – Experimental determination of frequency of a tuning fork.		
	Ultrasonic – Introduction – Production of ultrasonic waves by piezo-electric method – Properties and applications.		

Unit	Name of the Topic	Hours	Marks
V	<p>Acoustics of buildings – Reverberation, reverberation time, Sabine’s formula for reverberation time (no derivation) – Coefficient of absorption of sound energy – Noise pollution – Noise control in machines.</p> <p>Simple problems based on expression for frequency of vibration.</p> <p><b>5.2 MAGNETISM</b> Coulomb’s laws of magnetism – Pole strength and unit pole – Definitions – Magnetic moment, intensity of magnetisation, magnetising field intensity, magnetic induction, permeability, hysteresis, saturation, retentivity and coercivity – Definitions-Method of drawing hysteresis loop of a specimen using a solenoid – Uses of Hysteresis loop</p>	6 Hrs	

**Text Book :**

- 1) Physics – Higher secondary – First year – Volume I & II – Tamil Nadu Text book Corporation 2004
- 2) Intermediate physics – Volume I & II – Anwar Kamal – Foundation books private Ltd. 2008

**Reference Book :**

- 1) Physics – Resnick and Haliday – Wisley Toppan publishers – England
- 2) Engineering Physics – B.L.Theraja – S. Chand Publishers
- 3) A text book of sound – R.L. Saighal & H.R. Sarna – S. Chand & Co.
- 4) Mechanics – Narayana Kurup – S. Chand Publishers.

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## I SEMESTER

### 21004 ENGINEERING PHYSICS – I MODEL QUESTION PAPER - 1

Time : 3 Hrs

Max Marks : 75

#### **PART- A**

Marks 15 x 1 = 15

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

1. Define unit.
2. Define derived Quantities.
3. Write Parallelogram Law of forces.
4. Define moment of a force.
5. Write Hooke's Law.
6. Define Co-efficient of viscosity.
7. Define Terminal velocity.
8. Write any two practical applications of capillarity.
9. Define trajectory.
10. Define angular velocity.
11. Define angle of banking.
12. Define frequency.
13. Define rigid body.
14. Write law of conservation of angular momentum.
15. Define escape velocity.
16. Write any two uses of artificial satellites.
17. Define resonance.
18. What is ultrasonic?
19. Define intensity of magnetisation.
20. Define retentivity.

#### **PART- B**

Marks 5 x 12 = 60

**Note :** i) Answer all Questions choosing any two sub divisions from each question.  
ii) All sub divisions carry equal marks.

- I
  - a) List the conventions followed in S I.
  - b) Derive expressions for the magnitude and direction of the resultant of two forces acting at a point with an acute angle and between them.
  - c) Describe an experiment to determine the mass of the given body using principle of moments.
- II
  - a) Describe an experiment to determine the Young's modulus of the material of a beam by uniform bending method.
  - b) Derive Poiseuille's formula for the co-efficient of viscosity of a liquid by dimensional method.
  - c) A capillary tube of bore 0.5 mm is dipped vertically in water of surface tension  $0.072 \text{ Nm}^{-1}$ . Find the height of capillary rise.
- III
  - a) A missile is fired at an angle of  $40^\circ$  to hit a target situated at a distance of 100 km. Find the velocity of projection of the missile.
  - b) Derive an expression for the angle of banking of a curved path.

- c) Show that simple harmonic motion can be obtained by the projection of a uniform circular motion on any diameter.
- IV**
- a) Derive an expression for the angular momentum of a rigid body rotating about an axis.
  - b) Derive an expression for the orbital velocity of a satellite.
  - c) Derive the expression for the variation of acceleration due to gravity with altitude.
- V**
- a) Explain the production of ultrasonic using Piezo electric generator.
  - b) A sonometer wire is loaded with a mass of 2 kg. The linear density of the wire is  $2 \times 10^{-3} \text{ kgm}^{-1}$ . When an excited tuning fork is placed on the sonometer box, the resonating length is found to be 15.4 cm. Find the frequency of the tuning fork.
  - c) Explain the method of drawing hysteresis loop of a specimen taken in the form of a rod, using a solenoid.

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**I SEMESTER**  
**21004 ENGINEERING PHYSICS – I**  
**MODEL QUESTION PAPER - 2**

Time : 3 Hrs

Max Marks : 75

**PART- A**

Marks 15 x 1 = 15

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

1. Write the two supplementary quantities.
2. Derive the dimensional formula for force.
3. Define coplanar forces.
4. Define moment of a couple.
5. Define Poisson's ratio.
6. What is the significance of Reynolds number?
7. Write any two practical applications of viscosity.
8. Define angle of contact.
9. Define time of flight of a projectile.
10. What is the relation between linear velocity and angular velocity ?
11. What is banking of a curved path?
12. Define simple harmonic motion.
13. Define radius of gyration.
14. Write the Newton's second law of gravitation.
15. What is the difference between mass and weight of a body?
16. Define orbital velocity.
17. Write the relation between wavelength, frequency and velocity of a wave.
18. Write any two applications of ultrasonic.
19. Define reverberation time.
20. What is coercivity?

**PART- B**

Marks 5 x 12 = 60

**Note :** i) Answer all Questions choosing any two sub divisions from each question.  
ii) All sub divisions carry equal marks.

- I a) Explain multiples and sub-multiples and the corresponding prefixes of units.
- b) Describe an experiment to verify Lami's theorem.
- c) Find the magnitude and direction of the resultant of two forces 3 N and 4 N acting at a point, if the angle between the forces is  $60^\circ$ .

- II a) Explain the elastic behavior of a material with the help of stress – strain curve.  
b) Describe an experiment to determine the coefficient of viscosity of a high viscous liquid by Stokes' method.  
c) Derive an expression for the surface tension of the liquid by capillary rise method.
- III a) Show that the path of a projectile is a parabola.  
b) Derive expressions for the normal acceleration and centripetal force acting on a body executing uniform circular motion.  
c) An aero plane travelling in a curved path with a speed of 500 kmph tilts through an angle of  $30^\circ$ , for safe negotiation. What is the radius of the curve?
- IV a) Derive an expression for kinetic energy of a rigid body rotating about an axis.  
b) Explain geo – stationary and polar satellites.  
c) Assuming the average radius of the earth as 6380 km, find the escape velocity of a body from the surface of the earth.
- V a) Describe an experiment to determine the frequency of a tuning fork using sonometer.  
b) Explain noise pollution and the measures to control the noise in machines.  
c) Explain the uses of hysteresis loop in the selection of magnetic materials.

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**ENGINEERING PHYSICS – I PRACTICAL**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21007**

Semester : I Semester

Subject Title : **ENGINEERING PHYSICS – I PRACTICAL**

**TEACHING AND SCHEME OF EXAMINATION** :

**No of weeks per semester: 16 weeks**

Subject	Instructions		Examination			Duration
	Hours /Week	Hours /Semester	Marks			
			Internal Assessment	Board Examination	Total	
<b>ENGINEERING PHYSICS – I PRACTICAL</b>	<b>2 Hrs</b>	<b>32 Hrs</b>	<b>25</b>	<b>75</b>	<b>100</b>	<b>3 Hrs</b>

**RATIONALE:**

In Diploma level Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

**GUIDELINES:**

- **All the Eight experiments given in the list of experiments should be completed and given for the end semester practical examination.**
- **In order to develop best skills in handling Instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.**
- **The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.**

### ALLOCATION OF MARKS

Formula with explanation	10 marks
Figure / Circuit diagram with parts	05 marks
Tabulation with proper units	10 marks
Observation (including taking readings)	35 marks
Calculation	10 marks
Result	05 marks
	—————
Total	75 Marks
	—————

## FIRST SEMESTER

### 21007 ENGINEERING PHYSICS - I PRACTICAL

#### LIST OF EXPERIMENTS WITH OBJECTIVES:

1. MICROMETER (SCREW GAUGE).  
To measure the thickness of the given irregular glass plate using micrometer. To Determine the area of the glass plate using a graph sheet and to calculate the volume of the glass plate.
2. VERNIER CALIPERS.  
To measure the length and diameter of the given solid cylinder using vernier calipers and to calculate the volume of the solid cylinder.
3. CONCURRENT FORCES.  
To verify the parallelogram law of forces and Lami's theorem.
4. POISEUILLE'S METHOD.  
To determine the coefficient of viscosity of water by capillary flow method, using Graduated burette without stopper (variable pressure head arrangement ).
5. STOKES' METHOD.  
To determine the coefficient of viscosity of a high viscous liquid.
6. SURFACE TENSION.  
To determine the surface tension of water by capillary rise method.
7. SONOMETER.  
To determine the frequency of the given tuning fork.
8. DEFLECTION MAGNETOMETER  
To compare the magnetic moments of the two bar magnets using deflection Magnetometer in Tan A position, by equal distance method .

**FIRST SEMESTER**  
**21007 ENGINEERING PHYSICS - I PRACTICAL**  
**LIST OF EQUIPMENT**

1. MICROMETER (SCREW GAUGE).  
Screw gauge, graph sheet and irregular glass plate.
2. VERNIER CALIPERS.  
Vernier Calipers and Solid Cylinder
3. CONCURRENT FORCES.  
Vertical drawing board, two Z pulleys, three sets of slotted weights (5 x 50g) and twine thread.
4. POISEUILLE'S METHOD.  
Burette stand, graduated burette without stopper, rubber tube, capillary Tube, beaker, digital stop watch and funnel.
5. STOKES' METHOD.  
Stokes' Apparatus, high viscous liquid (Castrol oil), glass beads of Different radii, digital stop watch and screw gauge.
6. SURFACE TENSION.  
Beaker with water, capillary tube, iron stand with clamp, pointer, travelling microscope and hydro static bench.
7. SONOMETER.  
Sonometer, screw gauge, tuning fork, rubber hammer, slotted weight hanger set (5 x 0.5kg) and paper rider.
8. DEFLECTION MAGNETOMETER  
Deflection Magnetometer, meter scale and two bar magnets.

## FIRST SEMESTER

### 21007 ENGINEERING PHYSICS - I PRACTICAL

#### MODEL QUESTION PAPER

1. Measure the thickness of the given irregular glass plate using micrometer. Determine the area of the glass plate using a graph sheet and calculate the volume of the glass plate.
2. Measure the length and diameter of the given solid cylinder using vernier calipers and then calculate the volume of the solid cylinder.
3. Verify the parallelogram law of forces and Lami's theorem using concurrent forces.
4. Determine the coefficient of viscosity of water by capillary flow method, using graduated burette.
5. Determine the coefficient of viscosity of a high viscous liquid by Stokes' method.
6. Determine the surface tension of water by capillary rise method.
7. Determine the frequency of the given tuning fork using sonometer.
8. Compare the magnetic moments of the two bar magnets using deflection magnetometer in Tan-A position, by equal distance method.

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**ENGINEERING CHEMISTRY - I**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21005**

Semester : I Semester

Subject Title : **ENGINEERING CHEMISTRY - I**

**TEACHING AND SCHEME OF EXAMINATION:**

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours/Week	Hours/Semester	Marks			
			Internal assessment	Board Examination	Total	
ENGINEERING CHEMISTRY-I	5 Hours	80 Hours	25	75	100	3 Hours

**Topics and Allocation of Hours:**

Sl. No	Topics	Time (Hours)
Unit-I	Molecular Mass and Equivalent Mass, Acids and Bases, Chemical Bonding	14 Hours
Unit-II	Solution, Technology of water and Solid state	14 Hours
Unit-III	Colloids and Nano particles, Photochemistry	14 Hours
Unit-IV	Electrochemistry, cell and Batteries	14 Hours
Unit-V	Corrosion Engineering	14 Hours
Revision and Examinations		10 Hours
<b>Total</b>		<b>80 Hours</b>

**Rationale:**

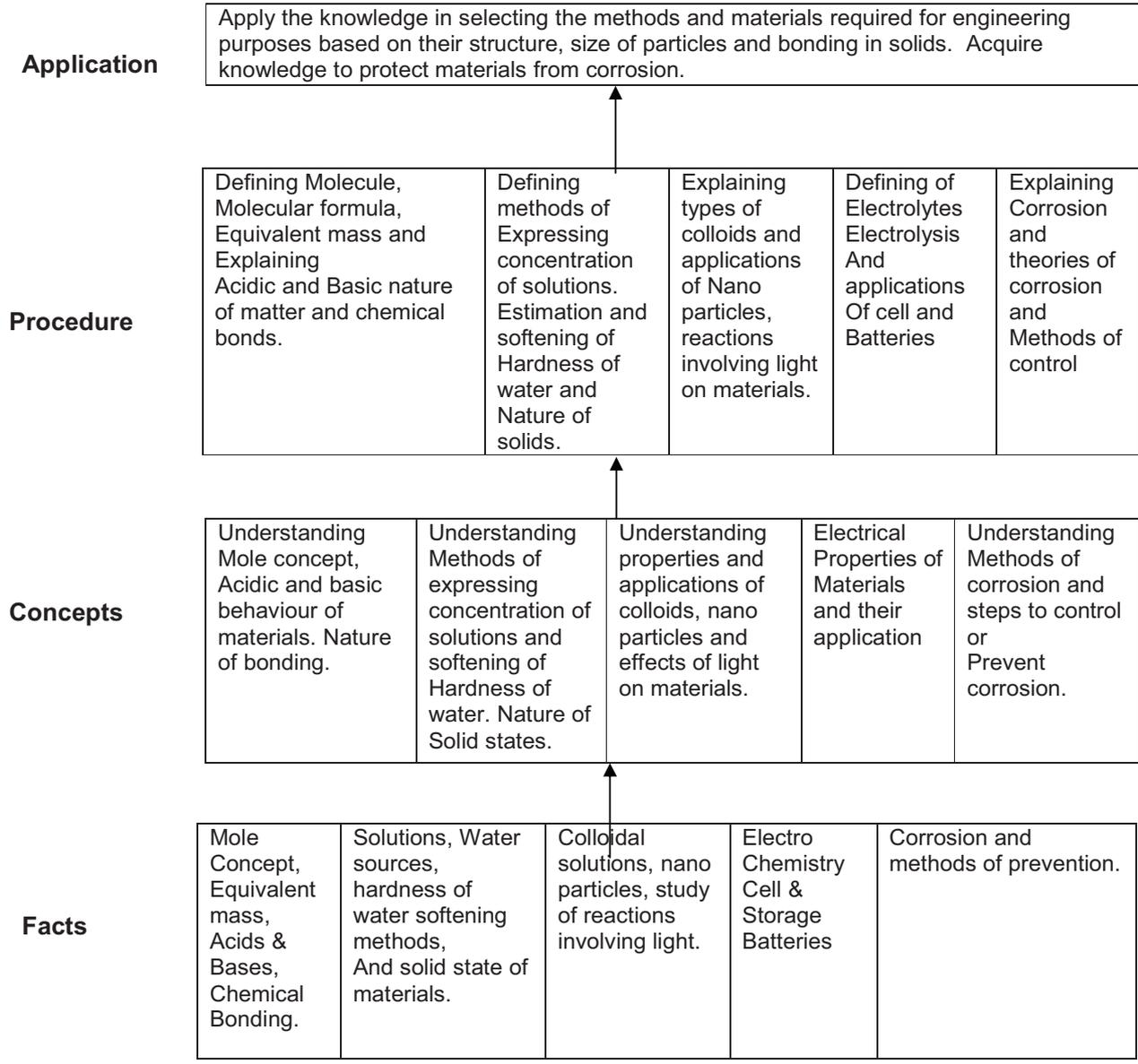
The Subject Engineering Chemistry creates foundation for understanding basic concepts of chemistry and its effects on Engineering Materials. Engineering Chemistry also impart knowledge of properties of materials and protecting them from corrosion and selecting right types of Materials used in various fields of Engineering and Industry.

**Objectives:**

**The objective of this Course is to make the student:**

1. Study about the importance of Engineering Chemistry in industry.
2. Know about Mole concepts and equivalence, Acids and bases and chemical bonds.
3. Learn about solutions, hardness of water, and solid states.
4. Know about Colloidal particles, Nano particles, Photochemistry and light reactions.
5. Explain the details of electrochemistry and batteries.
6. Understand Corrosion and preventive methods.

### Learning Structure



**DETAILED SYLLABUS**  
**CONTENT**

Unit No.	Name of the Topic	Hours	Marks
I	<p><b>1.1. Molecular Mass -4 Hours</b> Molecule- Molecular formula- Molecular Mass- Mole- Definition-Simple calculations- Avogadro's Hypothesis- Application- Relationship between Molecular Mass and Vapour Density. Gram Molecular Volume- Definition- Avogadro's Number-Definition- Simple Problems.</p> <p><b>1.2. Equivalent Mass -2 Hours</b> Equivalent Mass &amp; Gram Equivalent Mass- Definition- Determination of Equivalent Mass by Oxide Method (Direct Method)- Simple Problems.</p> <p><b>1.3. Acids and Bases: -5 Hours</b> Theories of Acids and bases-Arrhenius Theory - Lowry- Bronsted Theory - Lewis theory - Advantages of Lewis theory. Definition of pH &amp; pOH. Numerical problems – Indicators - Definition –Acid-Base concept of Indicators (Basic ideas) - Buffer solution- definition-types and examples. Application of pH in industries- Electronic Concept of Oxidation and Reduction- Definition- Example.</p> <p><b>1.4. Chemical bonding: -3 Hours</b> Definition-Ionic bonding-Formation of NaCl - Covalent bonding- formation of NH<sub>3</sub> – Coordinate bonding- formation of NH<sub>4</sub><sup>+</sup> ion - Metallic bonding - Electron sea model.</p>	14	15
II	<p><b>TECHNOLOGY OF WATER, CHEMICAL BONDING AND SOLID STATE</b></p> <p><b>2.1. Solution -4 Hours</b> Definition- Methods of Expressing Concentration of a Solution: Molarity, Molality, Normality, Mole fraction, Percentage, Mass- Simple Problems.</p> <p><b>2.2. Technology of Water - 7 hours</b> Sources-depletion of underground water-reasons-rainwater harvesting. (Basic ideas)-advantages-hard and soft water-carbonate, non -carbonate hardness-methods of expressing hardness-mg/lit, ppm-simple problems-Estimation of total hardness by EDTA method-problems involving total, carbonate, non-carbonate hardness in ppm-softening of hard water ion- Exchange method, Reverse Osmosis method - standards of drinking water-Municipal water supply-purification (sedimentation, filtration and sterilization)- Disadvantages of hard water in boilers -Scale formation, Corrosion of boiler metal, Caustic Embrittlement - Priming and Foaming</p>	14	15

Unit No.	Name of the Topic	Hours	Marks
II	<p><b>2.3. Solid state: – 3 Hours</b>            Structure of Solids- Definition and examples for ionic, Molecular, Covalent and Metallic solids- Unit cell- bcc, fcc and hcp packing of metals –examples and properties reflected by the packing of atoms. (no numerical problems)</p>		
III	<p><b>3.1. Colloids – 5 Hours</b>            Definition- sols-True solution and Colloidal solution-differences-Types- Lyophilic &amp; Lyophobic sols- Differences.- Properties- Tyndall effect, Brownian movement, Electrophoresis, Coagulation – Industrial applications- Smoke Precipitation - Cottrell’s method, Purification of water, Cleaning action of soap, tanning of leather and sewage disposal.</p> <p><b>3.2. Nano-Particles – 2 Hours</b>            Definition- Area of application - Medicine, Electronics and biomaterials.</p> <p><b>3.3. Photochemistry – 7 Hours</b>            Introduction-Important terms- charge transfer, electronic energy migration, emission, Excited state, Frequency, Ground state, Fluorescence, Phosphorescence, Chemiluminescence - photo electric cell- photo emission cell- photo synthesis-general chemical reactions-chlorophyll and accessory pigments-Mechanism of light reactions-Dark reaction-photosynthesis and acid rain.</p>	14	15
IV	<p><b>ELECTRO CHEMISTRY, CELL AND BATTERIES</b></p> <p><b>4.1. Electro Chemistry: – 5 Hours</b>            Electrolytes- Strong and weak electrolytes-Definition-examples. Electrolysis- Definition- Mechanism- Industrial applications of electrolysis –electro-plating -Preparation of surface- factors affecting the stability of the coating - Chrome plating - electro less plating.- Definition- advantages over electroplating- applications</p> <p><b>4.2. Cell: – 4 Hours</b>            Electro chemical cell- Single electrode potential- Galvanic cell- Formation - Daniel cell. Electrochemical series- Concentration Cell.</p> <p><b>4.3. Storage Batteries: – 5 Hours</b>            Primary, Secondary and fuel batteries. Primary battery - definition and example - Dry cell- construction and working. Secondary battery–definition- example- Lead acid storage cell -construction and working. Nickel/Cadmium battery – construction and working. Fuel cell- definition example H<sub>2</sub>/O<sub>2</sub> fuel cell [green fuel cell] - solar cells</p>	14	15

Unit No.	Name of the Topic	Hours	Marks
V	<p><b>Corrosion Engineering</b></p> <p><b>5.1. Corrosion – 4 Hours</b>            Definition- types - Theories of corrosion- Galvanic cell Formation theory- Differential aeration theory. - Factors influencing rate of corrosion.</p> <p><b>5.2. Methods of prevention of Corrosion – 5 Hours</b>            Control of Environment, Alloying, Surface coating- Metal coating- Electroplating, Galvanization and Tinning- Inorganic coating- Anodizing and Phosphating- Cathodic protection Sacrificial anode and Impressed voltage methods.</p> <p><b>5.3. Organic coating: – 5 Hours</b>            Paints-definition- components of paints and their functions- Varnish-Definition-types-Preparation of oil varnish-Difference between paint &amp; varnish-Special paints- Luminescent, heat resistant, fire retardant, Anti-fouling paints - cement paint, aluminium paint &amp; distemper. Dyes-Acid dyes-basic dyes - Mordant dyes -Definition only (No equations).</p>	14	15

**Text Books:**

1. Engineering Chemistry- Jain & Jain Dhanpat rai & Sons - 2005
2. A Textbook of Engineering Chemistry- S. S. Dara, S. Chand & Company Ltd. - 1996

**Reference Books:**

1. A Text book of Environmental Chemistry and Pollution Control S.S.Dara, S. Chand & Company Ltd. - 2007
2. Engineering Chemistry – Uppal- Khanna Publishers. - 1986
3. Higher Secondary +2 Chemistry Vol. I & II Tamil Nadu Textbook Corporation, Chennai. - 2005
4. Environmental chemistry VP KUDESIA-PRAGATI PRAKASHAN

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**ENGINEERING CHEMISTRY - I**  
**MODEL QUESTION PAPER -1**

Time: 3 Hrs

Max. Marks: 75

**PART A**

I. Answer Any Fifteen Questions: -

[15x1=15]

All Questions carry equal marks

1. What is Mole.
2. Define pOH.
3. Define Lewis acid.
4. Define ionic bond.
5. Define Normality.
6. What salts are present in temporary hard water?
7. What is the expansion of EDTA?
8. Given an example for Covalent solid.
9. What is the dispersion medium in starch solution?
10. What are the types of Colloids?
11. Define Photosynthesis.
12. Define Phosphorescence.
13. What type of reaction takes place at anode during corrosion of iron?
14. Mention the factors affecting stability of Coating.
15. Give an example for fuel cell.
16. What is the anode and electrolyte used in chrome plating?
17. What is dry Corrosion?
18. Mention any two factors connected with metal surface influencing rate of corrosion.
19. Give two examples for Sacrificial anodes.
20. What are dyes?

**PART-B**

II. Answer any Two Sub divisions in each of the following questions:-

[5x12=60]

All Questions carry equal marks

1. a) Derive the relation between Molecular Mass and vapour density.  
b) Describe determination of Equivalent Mass of a metal by Oxide method.  
c) Define and Explain the Lewis Concept of Acid and base.
2. a) How will you estimate the total hardness of a sample of water by EDTA method?  
b) Explain bcc and fcc packing with suitable example.  
c) Explain ion change process of softening hard water?
3. a) Explain mechanical and optical properties of Colloids.  
b) Distinguish between Lyophobic and Lyophilic colloids.  
c) Write notes on Mechanism of Light and Dark reactions.
4. a) Explain electrolysis with a suitable example.  
b) What is electroless plating? Explain with a suitable example.  
c) Describe a Lead-acid storage cell with a neat diagram.
5. a) Explain the formation of concentration cell.  
b) Explain Galvanic cell formation or theory of Corrosion.  
c) What is galvanization? How is it carried out?

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**ENGINEERING CHEMISTRY - I**  
**MODEL QUESTION PAPER – 2**

Time: 3 hours

Max. Marks:75

**Part – A**

I. Answer any 15 questions

(15 x 1 =15)

All Questions carry equal marks

1. What is the value of Avogadro's Number.
2. What is the mass of 1 mole of Sulphuric Acid.
3. Define pH.
4. What is an acidic buffer?
5. What is one normal Solution?
6. Define hard water.
7. Mention any two disadvantages of hard water in boilers.
8. Mention the names of different types of solids.
9. What are the types of colloids?
10. What are called nano particles?
11. What is Tyndall Effect?
12. What is Fluorescence?
13. Define Electrolysis.
14. Define electroless plating.
15. What are the types of batteries?
16. What is meant by electrochemical series?
17. Define corrosion.
18. Mention the names of methods used for prevention of corrosion.
19. Define Galvanization.
20. Give two examples of acid dyes.

**Part – B**

II. Answer any two subdivisions in each of the following questions:

(5 x 12=60)

All Questions carry equal marks

1.
  - a) Explain Lowry-Bronsted theory of acids and bases.
  - b) Calculate the [H<sup>+</sup>] ion concentration of a solution whose pH is 4.3.
  - c) Explain Electron-Sea model of metallic bonding
2.
  - a) Define Molality. Calculate the molality of a solution containing 2 gms of NaOH dissolved in 500gms of water.
  - b) Explain the reverse osmosis method for softening of hard water.
  - c) Write a note on covalent solids with suitable examples.
3.
  - a) Define colloids. What are the differences between a colloidal solution and a true solution?
  - b) Write notes on Electrophoresis and Brownian movement.
  - c) Explain Photosynthesis.
4.
  - a) Explain chromeplating.
  - b) Explain the construction and working of a Daniel cell.
  - c) What is a Fuel cell? Write a note on H<sub>2</sub>/O<sub>2</sub> Fuel cell.

5. a) What are the factors influencing the rate of corrosion? Explain any two factors.  
b) Explain Cathodic protection method of preventing corrosion.  
c) What are varnishes? Explain the preparation of oil varnish.

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**ENGINEERING CHEMISTRY – I PRACTICAL**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21008**

Semester : I Semester

Subject Title : **ENGINEERING CHEMISTRY – I PRACTICAL**

**SCHEME OF INSTRUCTIONS AND EXAMINATION:**

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours/Week	Hours/Semester	Internal assessment/Record	Board Examination	Total	Duration
ENGINEERING CHEMISTRY- I PRACTICAL	2	32	25	75	100	3 Hours

**OBJECTIVES:**

- At the end of the program the student will have knowledge about volumetric analysis in acidimetric, Alkali metric and permanganometric titrations and their applications.
- To give knowledge of estimation of total Hardness, temporary and permanent hardness in the hard water sample.
- To get knowledge about measurement of pH and to calculate Hydrogen ion concentration in a solution.

**1. INTERNAL ASSESSMENT/ RECORD: 25 MARKS**

**2. BOARD EXAMINATION EVALUATION: 75 MARKS**

**VOLUMETRIC ANALYSIS / EDTA TITRATION**

Procedure	5 Marks
Viva-Voce	5 Marks
I-Titration	25 Marks
II Titration	25 Marks
Calculations	3x5 = 15 Marks
Total	75 Marks

### DETERMINATION OF PH

Answer for short Question on pH	5 Marks
Viva-voce	5 Marks
Determination of pH (5 Samples)	40 Marks
Calculation of H <sup>+</sup> ion concentration	25 Marks
Total	75 Marks

### ENGINEERING CHEMISTRY-I PRACTICAL CONTENTS

#### **Intellectual Skills:**

1. Titrations and Calculation of masses.
2. Knowing units for concentration of solutions

#### **Motor Skills:**

1. Measure the quantities accurately
2. Handling the apparatus carefully.

#### **Acidimetry and Alkalimetry:**

1. Estimation of Sulphuric acid, using a standard solution of oxalic acid and NaOH as Link solution - Phenolphthalein indicator.  
[Test solution should be made up to 100ml]
2. Estimation of sodium hydroxide using a standard solution of sodium carbonate Using sulphuric acid-as link solution -Methyl orange indicator.  
[Test solution should be made up to 100ml]
3. Comparison of strengths of two acid solutions using a link solution of NaOH-Phenolphthalein Indicator.
4. Comparison of strengths of two alkaline solutions using an acid (oxalic acid).- Phenolphthalein Indicator.

#### **Permanganometry:**

5. Estimation of Mohr's salt solution using a standard solution of ferrous sulphate and link solution of potassium permanganate  
[Test solution should be made up to 100ml]
6. Estimation of ferrous Sulphate using standard solution of Mohr's salt solution and link solution of potassium permanganate  
(Test solution should be made up to 100 ml).

#### **Water Analysis:**

7. Estimation of total hardness of a water sample using EDTA .
8. Determination of pH using a pH-meter [for five given samples] and to calculate the hydrogen ion concentration in the solutions.[This question may be given to any two students per batch].

### MODEL QUESTION PAPER

#### **MODEL: 1**

**3 Hours**

1. Estimate the mass of Sulphuric acid Present in whole of the given solution. You are supplied with a standard solution of oxalic acid of strength 0.098N and an approximately decinormal solution of Sodium hydroxide.

#### **MODEL: 2**

**3 Hours**

2. Calculate the total hardness of the given sample of water. You are given a standard Hard water Solution of 0.01M and an approximately 0.01M EDTA solution.

#### **MODEL: 3**

**3 Hours**

3. Calculate pH of given five samples, using pH meter and calculate the H<sup>+</sup> ion Concentration of samples. (Any two Students only in a batch).

### SCHEME OF VALUATION

Short Procedure (Common to all titration). /

For pH determination question, any two PART A questions -in – 5  
pH chapter may be asked.

} marks

Viva Voce (common to all)

- } 5 Marks

#### I. VOLUMETRIC ANALYSIS:-

Titration Value accuracy for I & II----- ± 0.2 ml	- 25x2=50
above ± 0.2 to 0.4 ml	- 21 Marks
above ± 0.4 to 0.6 ml	- 17 Marks
above ± 0.6 ml	- 5 Marks

#### **Calculations:**

Titration I	- 5 Marks
Titration II	- 5 Marks
Result	- 5 Marks

For Arithmetic errors, 25 % marks may be reduced

#### II. DETERMINATION OF pH VALUES:

Determination of pH for 5 Samples	- 5x8=40 Marks
If Accuracy ± 0.2	- 8 Marks
If Accuracy ± 0.2 to 0.4	- 6 Marks
If Accuracy ± 0.4 and above	- 4 Marks
Calculation of H <sup>+</sup> ions concentration	- 5x5 = 25 Marks

#### III. EDTA TITRATION

Titration-I	- 25 Marks
Titration-II	- 25 Marks
Calculation	- 15 Marks

For Arithmetic errors, 25 % marks may be reduced

Accuracy on par with ordinary titration (as above)

## FIRST YEAR ENGINEERING CHEMISTRY LABORATORY

### LIST OF EQUIPMENTS

List of equipments needed for a batch of 30 students in Chemistry Laboratory

#### **Non-Consumable Items:**

- |                                |                    |
|--------------------------------|--------------------|
| 1. Indane gas Connection (DBC) | 1 no               |
| 2. Exhaust Fan (High capacity) | Sufficient Numbers |
| 3. Fire Extinguisher           | 1 no               |
| 4. First Aid Box (Full set)    | 2 nos              |
| 5. Safety chart                | 1 no               |
| 6. Chemical Balance            | 1 no               |

- |                                       |       |       |
|---------------------------------------|-------|-------|
| 7. Fractional weight box              | 1 no  |       |
| 8. PH meters                          |       | 5 nos |
| 9. Working Table with all accessories | 8 nos |       |

**Glassware and Other Items :**

- |                                      |          |          |
|--------------------------------------|----------|----------|
| 1. Burette 50ml                      |          | 35 nos   |
| 2. Pipette 20ml (with safety bulb)   |          | 35 nos   |
| 3. Conical Flask 250ml               | 35 nos   |          |
| 4. Funnel 3" (Polythene)             |          | 50 nos   |
| 5. Porcelain Tile 6x6"               |          | 35 nos   |
| 6. Measuring Cylinder                |          |          |
| a. 100ml                             | 5 nos    |          |
| b. 500 ml                            | 3 nos    |          |
| 7. Reagent Bottle (White) 250ml      |          | 60nos    |
| 8. Reagent Bottle (White) 125ml      |          | 100 nos  |
| 9. Reagent Bottle (Amber) 250ml      |          | 80 nos   |
| 10. Test tubes                       |          |          |
| a. 15 x 1.5mm                        |          | 1000 nos |
| b. 15 x 2.5mm                        |          | 500 nos  |
| 11. Test tube stand                  |          | 35 nos   |
| 12. Test tube holder                 |          | 35 nos   |
| 13. Test tube cleaning brush         |          | 35 nos   |
| 14. Glass Trough                     | 5 nos    |          |
| 15. Beakers                          |          |          |
| a. 1000 ml                           |          | 5 nos    |
| b. 500 ml                            |          | 5 nos    |
| c. 250 ml                            |          | 35 nos   |
| d. 100 ml                            | 5nos     |          |
| 16. Glass Rods 15cm                  |          | 100 nos  |
| 17. Watch Glass 3"                   |          | 35 nos   |
| 18. Wash Bottle (Polythene) 1000ml   |          | 35 nos   |
| 19. Nickel Spatula                   |          | 10 nos   |
| 20. Kipps Apparatus                  |          | 1 no     |
| 21. Burner Nipple                    | 30 nos   |          |
| 22. Bunsen Burner for gas connection | 30 nos   |          |
| 23. Wire Gauge with asbestos center  | 15 nos   |          |
| 24. Plastic Buckets (15 lts)         |          | 10 nos   |
| 25. Tripod Stand (Iron)              |          | 30 nos   |
| 26. Filter Paper Round sheets        | 1000 nos |          |
| 27. Burette stand                    |          | 35 nos   |
| 28. Standard flask 100 ml            | 35 nos   |          |
| 29. Pipette 10ml                     |          | 5 nos    |

\*\*\*

**List of Apparatus to be supplied for each student in Chemistry lab during FIRST Semester  
Practical Class/Board Examination  
in addition to the required Solutions.**

1. Burette 50ml		- 1
2. Pipette 20ml (with safety bulb)		- 1
3. Conical Flask 250ml		- 1
4. Funnel		- 1
5. Porcelain Tile 6x6"		- 1
6. Burette stand		- 1
7. Standard flask 100 ml	- 1	
8. Beakers 250 ml		- 1
9. Wash Bottle		- 1
		--XX--



**ENGINEERING GRAPHICS - I**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV  
 Subject Code : **21006**  
 Semester : I Semester  
 Subject Title : **ENGINEERING GRAPHICS – I**

**Objectives**

At the end of the practice, the students will be able,  
 To state the importance of drawing.  
 To identify the drawing instruments.  
 To practice the methods of dimensioning.  
 To construct conics and special curves.  
 To trace the projection of points and straight lines.  
 To draw orthographic views from isometric drawings.

**SCHEME OF INSTRUCTION AND EXAMINATION**

No. of Weeks per Semester: 16 Weeks

Subject	Instruction		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
ENGINEERING GRAPHICS - I	6	96	Internal	Examination	Total	3 Hrs.
			25	75	100	

**TOPICS AND ALLOCATION**

Sl.No.	Topics	Hours.
1	Drawing office practice	12 Hrs.
2	Constructions of conics and special curves	24 Hrs.
3	Projection of points and straight lines	12 Hrs.
4	Orthographic projections	39 Hrs.
	Test	9 Hrs.

**DETAILED SYLLABUS**

**Unit-1**

**12 Hrs.**

**1. 1. Drawing office practice**

- 1.1.1 Importance of engineering drawing - drawing instruments: drawing board, mini drafter, compass, divider, protractor, drawing sheets etc., - layout of drawing sheets.
- 1.1.2 Importance of legible lettering and numbering - single stroke letters - upper case and lower case letters- general procedures for lettering and numbering - height of letters - guidelines.
- 1.1.3 Dimensioning - Need for dimensioning - terms and notations as per BIS - Dimension line, Extension line and Leader line - Methods of dimensioning – Importance of dimensioning rules - Exercises.
- 1.1.4 Scales - Study of scales - full size scale, reduced scale and enlarged scale.

## **Unit-2**

**24 Hrs.**

### **2.1 Constructions of conics .**

- 2.1.1 Conics: Different types – Definition of locus, focus and directrix - Applications of ellipse, parabola and hyperbola.
- 2.1.2 Ellipse: Construction of ellipse by concentric circle method, rectangular method and Eccentricity method when focus and directrix are given – Practical applications.
- 2.1.3 Parabola: Construction of parabola by rectangular method, parallelogram method and eccentricity method when focus and directrix are given– Practical applications.
- 2.1.4 Hyperbola: Construction of hyperbola by rectangular method and eccentricity method when focus and directrix are given– Practical applications.

### **2.2 Constructions of special curves.**

- 2.2.1 Geometric curves: Definition, application and construction of cycloid - epicycloid – hypocycloid – exercises.
- 2.2.2 Involute of a circle - Archimedean spiral – helix – exercises.

## **Unit-3**

**12 Hrs.**

### **3.1 Projection of points.**

- 3.1.1 Projection of points – points in different quadrants.

### **3.2 Projection of straight lines.**

- 3.2.1 Projection of straight lines – parallel to one plane and perpendicular to other plane – inclined to one plane and parallel to the other plane – parallel to both the planes – inclined to both the planes (simple problems only).

## **Unit-4**

### **4.1. Orthographic projection**

**39 Hrs.**

- 4.1.1 Introduction – projection terms - Orthographic projection - Co-ordinate planes of projection - Systems of orthographic projection - First angle orthographic projection- Third angle orthographic projection - Comparison of first and third angle projections.
- 4.1.2 Projection of three views (Elevation, Plan, Side view) of simple objects using first angle projection only - exercises.

**TEST**

**9 Hrs.**

### **Text Books**

1. Gill P.S., “Engineering drawing”, S.K.Kataria & Sons.
2. Bhat N.D., “Engineering drawing”, Charotar Publishing House.

### **Reference Books**

1. Gopalakrishnan.K.R., "Engineering Drawing", (Vol.I and Vol.II), Dhanalakshmi publishers, Edition 2, 1970
2. Venugopal.K, Sreekanjana G, “Engineering Graphics” New Age International Publishers.
3. K V Nataraajan “A Text Book of Engineering Drawing”
4. Thomas E.French, Charles J.Vierck, Robert J.Foster, “Engineering drawing and graphic technology”, McGraw Hill International Editions.
5. Barkinson & Sinha, "First Year Engineering Drawing", Pitman Publishers.
6. Shah/Rana, “Engineering Drawing”, Pearson Longman.

\* \* \*

**ENGINEERING GRAPHICS – I**  
**I Semester**

**Learning Structure:**

**Problem**

To acquire the skill of visualizing, interpreting and drawing the curves, projection of points and straight lines and orthographic projections.

**Procedure**

Read, understand, visualize, interpret and draw engineering curves, projection of points and straight lines and orthographic projections

**Principles**

Diagonal scale, plain scale, dimensioning techniques and orthographic projections by 1<sup>st</sup> angle method

**Concept**

First angle and Third angle method - projections-dimensioning - engineering drawings as per IS Code.

**Facts**

Various objects, geometric entities, line, arc, circles, , drawing instruments

### Board Examination – QUESTION PATTERN

Time: 3 Hrs.

Max.Marks: 75

[Note: Answer all the questions in the drawing sheet.]

**Part A** (Answer any four questions. Each question carries TEN marks.) 4X10 =40 marks

1. One question from dimensioning.
2. Three questions form construction of conics (Ellipse, Parabola and Hyperbola) and special curves. **At least one question from special curves should be asked.**
3. One question from projection of straight lines.

**Part B** (Draw three views in the first angle projection.)

35 marks

4. One question for orthographic projection.

#### Internal Marks

25 marks

Class work - submission of drawing sheets	-	10 marks
Test (including model examination)	-	10 marks
Attendance	-	5 marks
<b>Total</b>	<b>-</b>	<b>25 marks</b>

### ENGINEERING GRAPHICS - I MODEL QUESTION PAPER - 1

Time : 3Hours

Max. Marks : 75

[N.B. (1) First angle projection is to be followed. (2) All the questions are to be answered in drawing sheet supplied. (3) All dimensions are in mm. (4) Credit will be given for neatness.]

**PART-A** (Answer any four questions. Each question carries ten marks.)

4 X 10 = 40

1. Read the dimensioned drawing shown in fig.1. Redraw the figure to full size and dimension it as per Indian Standards.

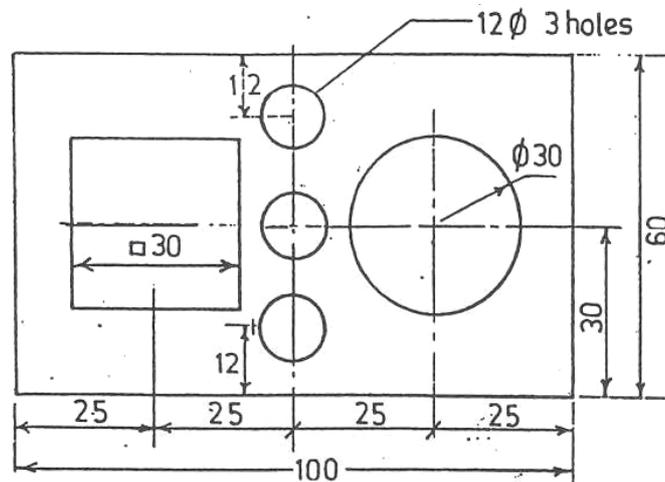


Fig. 1

2. A cricket ball thrown from the ground level reaches the wicket keeper's gloves. Maximum height reached by the ball is 5m. The ball travels a horizontal distance of 11m from the point of projection. Trace the path of the ball.
3. The head lamp reflector of a motor car has a maximum rim diameter of 130mm and maximum depth of 100 mm. Draw the profile of the reflector and name it.

4. Draw the cycloid formed by rolling circle of 50 mm in diameter.

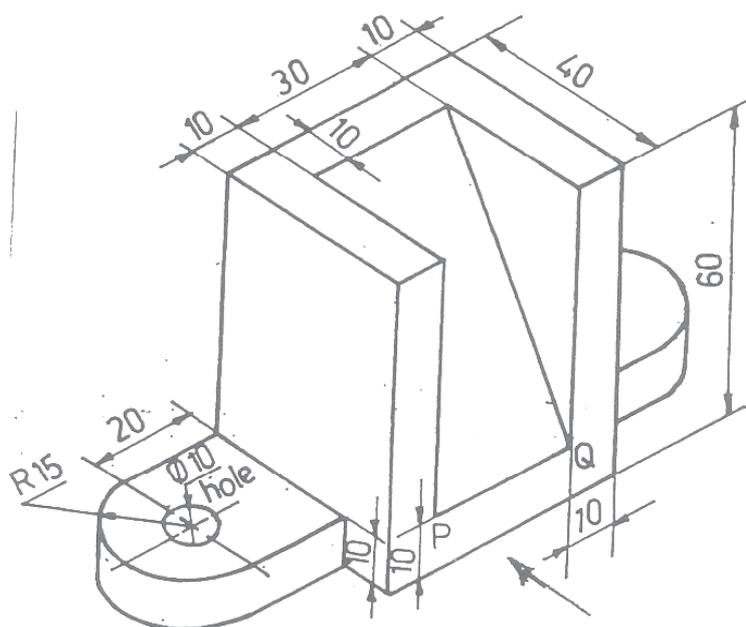
5. A line AB 60 mm long has its end A in both the H.P. and V.P. it is inclined at  $45^\circ$  to H.P. and  $30^\circ$  to V.P. Draw the projections of the line AB.

**Part B**

**35 marks**

6. The Pictorial view of an object is shown in fig.3. Draw the following views to full size scale.

- a) Elevation in the direction of arrow - 15 Marks
- b) Left end elevation - 10 Marks
- c) Plan - 10 Marks



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**ENGINEERING GRAPHICS - I  
MODEL QUESTION PAPER - 2**

**Time : 3Hours**

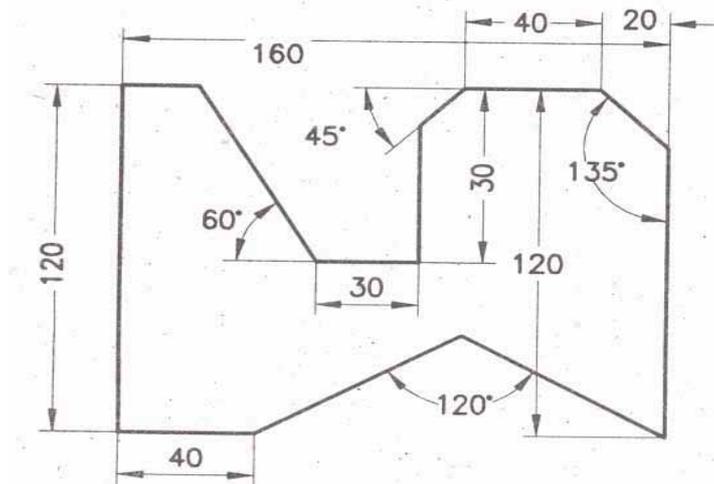
**Max. Marks : 75**

[N.B. (1) First angle projection is to be followed. (2) All the questions are to be answered in drawing sheet supplied. (3) All dimensions are in mm. (4) Credit will be given for neatness.]

**PART-A** (Answer any four questions. Each question carries ten marks.)

4 X 10 = 40

1. Read the dimensioned drawing shown in fig.1. Redraw the figure to full size and dimension it as per Indian Standards.



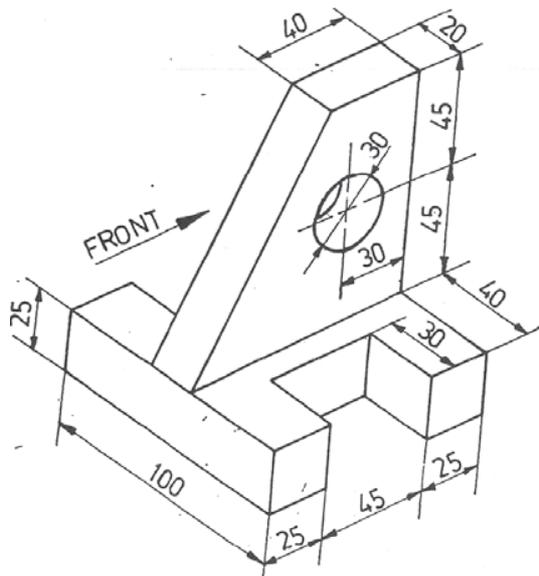
**Fig. 1**

2. A flowerbed in a botanical garden is in elliptical shape with major and minor axis dimensions are 10m and 6m respectively. Draw profile of the flowerbed by concentric circles method.
3. Construct a hyperbola when the distance between the focus and directrix is 40mm. The eccentricity is  $\frac{4}{3}$ .
4. A circle of diameter 50 mm rolls on the outside of another circle of diameter 180 mm without sliding. Draw the path traced by a point on the smaller circle.
5. A line AB 50 mm long is inclined at an angle of  $30^\circ$  with the H.P. and parallel to the V.P. Draw the projections when the end A is 15 mm in front of the V.P. and 10 mm above the H.P.

**Part B**

**35 marks**

6. The Pictorial view of an object is shown in fig.3. Draw the following views to full size scale.
  - a) Elevation in the direction of arrow - 15 Marks
  - b) Left end elevation - 10 Marks
  - c) Plan - 10 Marks



**Fig. 3**



## **COMMUNICATION ENGLISH - II**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**

(Being implemented from the Academic Year 2011-2012 onwards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes

Subject Code : **22001**

Semester : **II SEMESTER**

Subject Title : **COMMUNICATION ENGLISH – II**

Teaching and Scheme of Examination: No. of Weeks per Semester: **16 Weeks**

Subject	Instruction		Examination			
	Hours/Week	Hours/Semester	Marks			Duration
			Internal assessment	Board Examination	Total	
Communication English - II	4 Hours	64 Hours	25	75	100	3 Hours

**Topics and Allocation of Hours:**

Sl. No.	Section	No. of Hours
1	Part-A:Grammar	28
2	Part-B:Composition/Comprehension	24
3	Part-C:Literature(Prose & Poetry)	12
TOTAL		64

**Part - C Literature(Prose & Poetry) : No. of Hours: 12**

Sl.No.	Prose
1.	Macbeth
2.	The Green House Effect
3.	Maori Villages
4.	Light Destroys Darkness
	<i>Poetry</i>
1.	A Poison Tree
2.	The Storm
3.	Can Earth Be Earth?

## **RATIONALE**

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 and 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, both in spoken(oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, grammatical ability, enhance writing skills, correspond with others and develop skills in reading and writing English.

## **SPECIFIC INSTRUCTIONAL OBJECTIVES**

Reading 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. 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 reading skill shapes one's personality.

## **READING SKILL**

### **The student is able to**

- 1.1 Understand the difficult words and phrases in the lesson
- 1.2 Use the words and phrases correctly in his own sentences
- 1.3 Read the lesson properly without mistakes
- 1.4 Read the given passage correctly
- 1.5 Read the charts and diagrams
- 1.6 Read the advertisements and the news items in English magazines

## **WRITING SKILL**

### **The student is able to**

- 2.1 Write the answers correctly to the questions on the lessons
- 2.2 Write impersonal letters, in the proper format without mistakes
- 2.3 Use idioms and phrases in his own sentences
- 2.4 Write grammatically correct sentences

## **PRACTICAL KNOWLEDGE OF GRAMMAR**

### **The student is able to**

- 3.1 Use verbs correctly
- 3.2 Transform the interrogative and exclamatory sentences into assertive sentence
- 3.3 Use interrogatives and negatives
- 3.4 Convert the Degrees of comparison into one another
- 3.5 Frame questions, question tag and give short form answers correctly
- 3.6 Identify the clauses

- 3.7 Transform the simple, complex and compound sentences into one another
- 3.8 Write directions for the road map
- 3.9 Differentiate the homophones
- 3.10 Use Idioms and phrases in sentences

### **COMPREHENSION**

#### **The student is able to**

- 4.1 Read and understand the unseen passage and answer the given questions
- 4.2 Understand the ideas expressed in pictures, diagrams, charts and interpret
- 4.3 Answer the questions on the news items and advertisements in the English Magazines
- 4.4 Make a précis of the given passage

### **GRAMMAR**

#### **The student is able to understand the**

- 1. Degrees of comparison
- 2. Interrogative exclamatory and assertive sentences
- 3. Clauses
- 4. Simple, complex and compound sentences
- 5. Direct and indirect speech
- 6. Homophones
- 7. Idioms and phrases

### **COMPOSITION**

- 1. Unseen Passage
- 2. Newspaper Report
- 3. Advertisement items
- 4. Precis writing
- 5. Impersonal Letter writing
- 6. Graphics

### **LITERATURE**

- a. Four prose Lessons                      b. Three poems
- 1 Small passages from the prose text. Three out of four small questions to be answered.
- 2 Five fill up the blanks from the prose text to be answered.
- 3 Small passages from the poems. Two out of three small questions to be answered.

### **LEARNING STRUCTURE**

To enable the students to comprehend the meaning of new words, use grammar, to understand the meaning of the unseen passages, pictures, charts, diagrams news paper reports and advertisements and answer the questions in an error-free and simple language.

<b>PROCEDURE</b>	<b>TEACHING GRAMMAR</b>	<b>COMPOSITION</b>	<b>LITERATURE</b>
Principles	Identification of Various Aspects of English Grammar	Exposure To Various Comprehension Exercises	Text Book of Prose Lessons And Poems
Concepts	Concept of Transformation of Sentences	Understanding The Written Text, Diagrammatic Representations And Visuals, Writing Letters	Enriching Vocabulary By Various Means
Facts	Parts of Speech ,Words , Phrases, Clauses, Sentences, Passages	Scoreboards, Newspaper Reports, Visuals, Diagrams	Learning Various Types of Texts And Messages

**SYLLABUS**  
**COMMUNICATION ENGLISH-II**  
**CONTENT**  
**PART - A [Non textual]**

**GRAMMAR**

- 1) Number(Conversion into plural in sentences)
- 2) Transformation of sentences
  - i. Interrogative into Assertive sentence
  - ii. Exclamatory into Assertive sentence
- 3) Answering the Verbal Questions in Affirmative and Negative
- 4) Clauses
- 5) Simple, Complex and Compound
- 6) Changing into negative without changing the meaning
- 7) Degrees of Comparison
- 8) Direct to Indirect Speech (reporting the dialogue)
- 9) Homophones (from the Bank)
- 10) Writing directions on the diagram for reaching a place (road map)
- 11) Idioms and phrases (from the Bank)

**PART - B**

**COMPOSITION**

- Unseen passage Comprehension
- Newspaper Report Comprehension
- Advertisement Comprehension
- Précis/ summary Writing
- Impersonal Letter Writing
- Graphics

**PART - C**

**Literature(Prose & Poetry) No. of Hours: 12**

Sl.No.	<b>Prose</b>
1.	Macbeth
2.	The Green House Effect
3.	Maori Villages
4.	Light Destroys Darkness
	<i>Poetry</i>
1.	A Poison Tree
2.	The Storm
3.	Can Earth Be Earth?

## REFERENCES (II Semester)

1. A.S Hornby ' The Advanced Learners Dictionary of Current English' Oxford University Press
2. Michael Swan,'Basic English Usage',ELBS /OUP
3. Longman Basic English Dictionary , Pearson Longman
4. A Junior English Grammar and Composition 'N.K.Aggarwal -Revised by A.F .Scott, Mac Millan
5. A Senior English Grammar and Composition 'N.K.Aggarwal
6. Spoken English For you ' G.Radha Krishna Pillai ,K.Rajeevan, Emerald Publishers
7. Written English For you ' G.Radha Krishna Pillai ,K.Rajeevan, P.Bhaskaran Nair, Emerald Publishers
8. Wren and Martin 'High School English Grammar and Composition 'S.Chand and co.,

**COMMUNICATION ENGLISH – II**  
**MODEL QUESTION PAPER-1**

Time : 3 hrs

Max Marks : 75marks

**PART – A**  
**GRAMMAR**

(24 + 6 = 30)

(12X2=24 marks)

**Each question carries 2 marks**

**Last question No: 2 carries 6 marks**

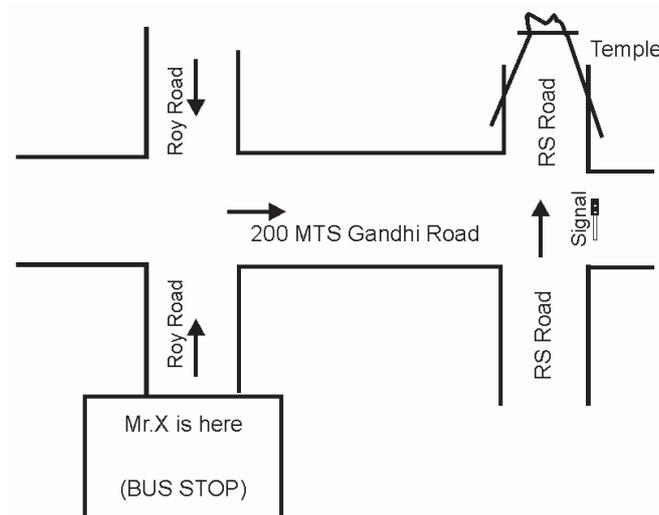
**1) Answer any twelve of the following as directed:**

- a) Change the following sentence into plural form:
  - i. He studies well.
  - ii. I am an alumnus of CPT.
- b) Convert the following interrogative into assertive sentence:  
Does this not look good?
- c) Convert the following exclamatory into an assertive sentence:  
“ How tall Selva is!”, said Ganesh.
- d) Answer the verbal question first in affirmative and then in negative:  
Do you like these flowers?
- e) Identify the main clause in the following sentence:  
He came running when the train was leaving the station.
- f) Identify the subordinate clause in the following sentence:  
The book that is on the table belongs to our library.
- g) Combine the following simple sentences to form a compound sentence and a complex sentence:
  - a. He studied well.
  - b. He got good marks.
- h) Change the following sentence into negative without changing the meaning:  
The road is narrow.
- i) Change the sentence into comparative degree:  
He is as good as my brother.
- j) Change the sentence into positive degree:  
This is the best hotel in the town.
- k) Convert the dialogue into reported speech:  
Ram : What are you doing ?  
Sam : I am reading a novel.
- l) Rewrite the following sentences, filling the blanks with the suitable homophones:

i) I want to \_\_\_\_\_ my car. ( cell / sell )

ii) Rama visited a \_\_\_\_\_. ( fare / fair)

m) Give two instructions to Mr.X for reaching the temple(Road map)



2) Use the following idioms and phrases in sentences of your own bringing out their meanings:

i) Hit the nail on its head

ii) Once in a bluemoon

iii) Achilles'heel.

## PART B

### COMPOSITION / COMPREHENSION

(6x5=30)

a) Read the following passage and answer the questions that follow

(5)

The coral is often mistaken for a flowering plant. It is actually the skeleton of a tiny, soft-bodied animal known as coral polyp. This animal has tentacles with which it catches as its food the planktons floating about. The polyp develops a cup shaped skeleton of limestone outside its body and lives inside it . Through an opening, it goes out and comes in. The tiny, young polyp buds grow like the branches of a tree. When an old polyp dies its skeleton is left behind to which the young ones remain attached and in turn they produce their new buds. This process goes on, fusing the skeleton together. In course of time, they grow into huge colonies which become coral reefs and island.

The largest reef is the great barrier reef of Australia and it is more than 2000 km long. The sea where it lies is called the Coral Sea. Corals are also found in the warm, shallow waters of the Indian Ocean, the South Pacific Ocean and the Mediterranean Sea.

The coral resembles beautiful flowers. The most beautiful of them looks like chrysanthemum (a kind of flower) which you may have seen in the flower shows. They have fascinating colours and shapes to attract small animals towards them, the strong tentacles around the mouth of the polyp strangle prey when they come near. So most of the animals prefer to avoid them although many sea creatures like crab, shrimps, sponges and some fish reside among them.

**i) Complete the following** (3x1=3)

1. The coral polyp catches its food, planktons with\_\_\_\_\_
2. The young ones remain attached to the skeleton of the old polyp \_\_\_\_\_
3. The small animals are attracted towards the coral because of their\_\_\_\_\_
- 4) Find the words from the passage which are the opposites of (2x1/2=1)
  - (a) rarely (Para 1)
  - (b) ugly (Para 3)
- 5) Find the words from the passage which mean the same as (2x1/2=1)
  - (a) To be similar (para3)
  - (b) Keep away from (para3)

**b) Read the following Newspaper Report carefully and answer the questions that follow :**

(5marks)

**ORACLE OCTOPUS PAUL NO MORE**

Berlin Oct, 26:

“Paul the octopus, who shot to fame during this year's football World Cup in South Africa for his flawless record in predicting game outcomes, has died,” his aquarium in Germany, said on Tuesday. “Management and staff at the Oberhausen Sea Life Center were devastated to discover that octopus Paul who achieved global renown during the recent World Cup, had passed away overnight,” the aquarium said in a sombre statement.

“Paul amazed the world by correctly predicting the winners of all Germany's World Cup clashes ,and then of the final.” Said Sea Life manager Stefan Porwoll.” His success made him almost a bigger story than the World Cup itself... We had all naturally grown very fond of him and he will be sorely missed”, said Porwoll. Paul's body is now in cold storage while the aquarium decides “ how best to mark his passing.”

However, Paul's fans need not despair. The aquarium has already been grooming a successor, to be named Paul like his mentor. “ We may decide to give Paul his own small burial plot within our grounds and erect a modest permanent shrine,” said Porwoll. ---AFP

**Questions:**

1. Who is called Paul? Is he alive now?
2. When did Paul achieve global renown ?
3. What was Paul famous for?
4. Where was his aquarium?
5. Name the successor of Paul.

C.) Read the following advertisement and answer the questions that follow: (5 marks)

<b>DEALERS REQUIRED</b>	<p>A 10 Year old manufacturing company is seeking to expand its operations &amp; i channel partners with entrepreneur skills for commercial LPG and Auto LPG pumps for the following states</p> <p><b>GUJARAT , MAHARASHTRA ANDHRAPRADESH , TAMIL NADU</b></p> <p>Interested parties may send the details of their current line of business, nature of firm ability to invest etc., within 10 days</p> <p><b>Pratly Gases Pvt.Ltd.</b></p> <p>303, B.N. Chambers , Opp Welcome Hotel , R.C. Dutt Road, Alkapuri , BARODA 390005 Phone:0265-2322950 (M) 09099926053 www.pratlygases.com</p>
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**Questions:**

1. Who has inserted this ad?
2. Is it a marketing company or manufacturing company?
3. Name any two states for which they seek partners.
4. What is the time limit for responding to the ad?
5. Complete: The company is manufacturing \_\_\_\_\_ .

**d.) Make a precis of the following passage with topic sentence and note making: (5)**

Contemporary urban lifestyle demands that we spend more than a third sometimes even half of our lives in the workplace. Infact, most urbanites, whatever their gender, derive their very identities from the work that they do. As a result, work has come to occupy a position of predominance in modern lives and the workplace has slowly become almost as important as home oftentimes, even being a substitute for it. This probably explains why many large business corporations invest substantially in increasing work environments that are friendly, and supportive.

Today, employees in many progressive companies besides doing their work, can eat, sleep, work, lounge around, read books and magazines and so on, without ever leaving the office, the idea being that if employees think of their workplace as a more engaging environment than home, they may then find it easier to spend increasing amount of time at work, thereby, ensuring greater productivity.

**e) Imagine You are S. Rani of Madurai.**

Write a letter to the editor of 'The Hindu' regarding the poor sanitary condition in your area.

(or) (5marks)

Place an order with M/S Goyal Publishers, 17 Anna Salai, Chennai – 2, for the supply of text books.

f) Study the following diagram carefully and convert it into a passage: (5 marks)

Murali Vijay

India

Full Name : Murali Vijay  
Date of Birth : Apr 01, 1984, Chennai  
Major Team : India, Tamil Nadu  
Playing Roll : Batsman

**Career Statistics**

International Debut : 2008  
ODI Debut : India v South Africa, Feb 27, 2010

M	Inns	Runs	HS	Ave	
Test	8	12	509	139	42.42
ODI	5	5	86	25	17.20
T20I	6	5	103	48	20.60

**Lead Questions:**

1. When did Vijay make his international debut?
2. What is his average score in ODI?
3. What is his highest score in test match?
4. How many ODI matches has he played?
5. Make your observation on Murali Vijay.

**PART-C**

**LITERATURE**

(15 Marks)

a) Answer any three of the following in one or two sentences each: (3 X 2 = 6 marks)

i. My friends live in a wooden house as do the Maoris themselves. Most of the houses in the district are of wood, for there are frequent earthquakes.....

Q: Why are the houses made of wood?

ii. The king : This is my decree. My second son will be my successor to my throne. He has realised the important duties of a King.

Q: Why does the king choose second son as his successor?

iii) The witches addressed him, for the third time.

Q: What is the third prophesy?

iv) Nitrogen, Oxygen, and Argon make up 98 percent of the earth's atmosphere.

Q: Do these gases contribute to Greenhouse effect? State the reason.

**b) Fill up the blanks and rewrite:** (5x1=5 marks)

- i. But isn't it very \_\_\_\_\_ to live here at all?
- ii. Your Majesty, the hall is dark. I wish to remove this\_\_\_\_\_
- iii. Using the two daggers placed by his wife he killed the king in his \_\_\_\_\_
- iv All signs now suggest that a major \_\_\_\_\_ change is happening again.
- v The \_\_\_\_\_ use the hot water for cooking, bathing...

**c) Answer any two of the following in one or two sentences each** (2x2=4 marks)

1. "I was once called earth  
But now bereft of mirth, I weep"  
Q: Explain "I Weep"
2. I told it not, my wrath did grow  
Q: What and whom did he not tell?
3. We wake to hear the storm come down  
Q: What are the effects of storm?

**COMMUNICATION ENGLISH – II**  
**MODEL QUESTION PAPER-2**

Time : 3 hrs

Max Marks : 75marks

**PART – A**  
**GRAMMAR**

(24 + 6 =30 )

(12X2=24 marks)

**Each question carries 2 marks.**

**Last question No: 2 carries 6 marks.**

**1. Answer any twelve of the following as directed:**

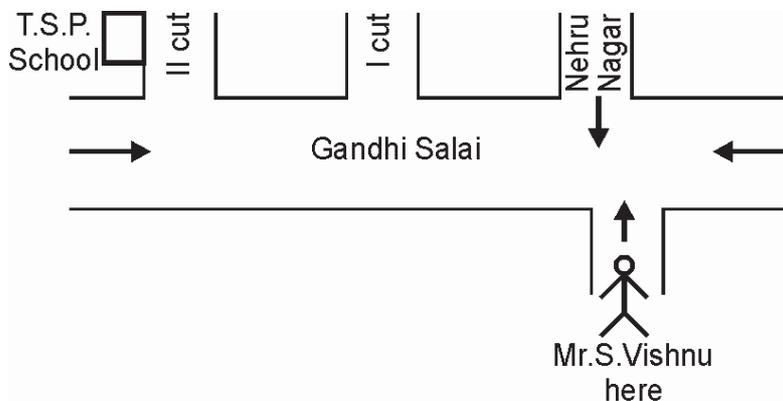
- a) Change the following sentences into plural form:
  - i) They want a book.
  - ii) He bought a car.
- b) Convert the following interrogative into assertive sentence:  
Isn't he good?
- c) Convert the following exclamatory into assertive sentence:  
What a nice man Gopal is!
- d) Answer the verbal question, first in affirmative and then in negative:  
Will they win the match?
- e) Identify the main clause in the following sentence:  
Though he was poor he was honest.
- f) Identify the subordinate clause in the following sentence:  
The teacher said that he would come over there.
- g) Combine the following simple sentences to form
  - i) a compound sentence and
  - ii) a complex sentence
  - a) There was a heavy rain.
  - b) The match was cancelled.
- h) Change the following sentence into negative without changing the meaning:  
It is common.
- i) Change it into superlative degree:  
Gold is costlier than any other metal.
- j) Change it into comparative degree:  
Bombay is the biggest city in India.
- k) Convert the dialogue into reported speech:  
Teacher: Is the work over?  
Student: I need one more day.

l) Rewrite the following sentences, filling the blanks with the suitable homophones:

i) The \_\_\_\_\_ of a baby is an occasion for joy in the family. (birth/berth).

ii) You have to keep a \_\_\_\_\_ on your expenditure. (check/cheque)

m) Give two instructions to Mr.S.Vishnu for reaching T.S.P School



**2 Use the following idioms and phrases in three different sentences of your own bringing out their meanings** (6 marks)

- i) For a short while
- ii) To rule out
- iii) Round the corner

## PART B

### COMPOSITION / COMPREHENSION

(6x5=30)

**a) Read the following passage and answer the questions that follow:**

(5 marks)

The first man-made satellite, Sputnik was launched by the Russians in 1957. It was perhaps the beginning of the space era. The Americans and the Russians seem to be involved in a race for space exploration. Each of them is keen to overtake the other in this race. India has also plunged into space exploration by putting her own satellites in orbits. We are, however, far behind the Russians and the Americans.

What are the advantages of space exploration? It is meaningless to spend colossal money and man-power on space research, if there are no returns. First, space exploration quenches our thirst for knowledge. Secondly, man – made satellites are already used in the field of communication. Radio and TV programmes are relayed by the artificial satellites. They are also used for weather forecasting. Thirdly, it has helped man to land on the moon. Our scientists are keen to find some planet where life exists. This will help man to migrate to some heavenly places and establish new colonies.

**Complete the following:**

1. The name of the first man-made satellite is \_\_\_\_\_.
2. \_\_\_\_\_ and \_\_\_\_\_ are involved in space-race.
3. Man made satellites are already used in the field of \_\_\_\_\_.

4. Find the words from the passage which are the opposites of :  
(a) ending (para 1)                      (b) natural (para 2)
5. Find the words from the passage which mean the same as :  
(a) Competition (para1)              (b) Merits (para2)

**b) Read the following newspaper report carefully and answer the questions that follow:**

(5marks)

#### AIRCRAFT SAFETY

### **Metro goes under at airport**

S. SUJATHA

DC CHENNAI

March 22: With concerns being raised over alleged compromises in safety in Metro Rail's elevated structure near the airport, Chennai Metro Rail Ltd has decided that the transit system now under construction will go underground for around 400 metres near the airport.

The underground stretch, on a portion that overlaps the air funnel area of the secondary runway, will increase the cost of constructing the portion by three times from the cost according to the original plan.

"We will take care of the concerns and fears expressed by airlines by going underground despite the Airport Authority of India giving us a no objection certificate to construct anything 3 meters high near the aircraft approach area," said a senior Metro Rail official.

CMRL has revised the cost of the project and the final draft of the modified proposal is being prepared. "we will soon submit the plan to the AAL," the official said.

The estimated cost of underground tunneling is Rs. 450 crore per km. while the cost of the elevated track is Rs. 150 crore per km.

Corridor 1 of Metro Rail was supposed to be on an elevated platform from Little Mount to the airport, but on objections by the airlines, CMRL prepared a plan to go underground just opposite Trident Hotel. The tracks of the transit system will go above ground soon after the plane approach area.

#### **Questions:**

1. What is CMRL ?
2. What is AAL ?
3. What is this news about?
4. What is the estimated cost of the underground tunnelling?
5. Who has raised objections for the elevated structure near airport?

c) Read the following advertisement and answer the questions that follow: (5 marks)

**AIEEE/AIPMT**

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**BITSA/VITEEE/AMRITA/SRMEEE/CMC/JIPMER/AFMC**

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**Comprehensive Training Program**

**From March 25**

**Join now**  
**RAJ Circle**

- Excellent classroom training by experienced faculty
- Comprehensive study material
- Previous years AIEEE/AIPMT solved booklet
- Test after every topic
- Centres all over Tamil Nadu

Places : Chennai, Madurai, Coimbatore, Trichy, Karur, Tanjore.  
Contact : Raj Circle, Mobile : 65462 72845.

**Questions:**

1. What is this advertisement about?
2. Who has inserted this ad?
3. Name any two places where training is given.
4. When does the program start?
5. Do they give study materials?

d) **Make a précis of the following passage with topic sentence and notemaking**

(5 Marks)

If you want to get on well in life, you must do your duty to the best of your ability. In this connection, it is right to say that the youth are the future rulers of the country. From this point of view, it will be quite clear that the future of students depends on how fast and how well development takes place. For this purpose it is a good idea that the students should really first train themselves. It means that they should do well in whatever they have chosen to study. It is not in any way wrong for them, when they can, to take part in other activities.

The government have been trying to encourage city students to go to the villages. Of course, it is better that the rural people do the village work and not the city people. But, at the same time, it is true that these two different societies are cut off. It is fair to say that this is not at all a good thing. We must do what all we can to close this gap.

e) **Imagine You are S.Rajan, DME of Madurai**

Write a letter to the Personnel Manager, XYZ Limited, Chennai, enclosing your curriculum vitae, for the post of supervisor. .

(or)

(5marks)

Place an order with M/S Abu sports, Trichy, for the supply of sports goods.

- f) **Study the following table carefully and convert it into a passage:** (5 marks)

Students selected on campus placement programme in a polytechnic college.

Branch	Corporate		
	WIPRO	TVS	INFOSYS
Computer	22	11	40
Civil	25	23	35
Electrical	45	12	17
Electronics	32	78	23
Mechanical	27	57	30

**Lead Questions:**

1. What is this chart about?
2. Name the corporates that visited the polytechnic.
3. Name the branches of engineering that appeared for placement.
4. How many students are selected for placement in INFOSYS?
5. How many students are selected in Civil Engineering Department?

**PART-C**

**LITERATURE**

(15 Marks)

**Answer any three of the following in one or two sentences each:**

(3X2=6 marks)

- a) 1) She filled Macbeth's mind with dreadful thoughts and deeds.

**Q:** What was the character of Macbeth's wife?

- 2) The hymns, we all sang together, the Maoris singing in their language, while the rest of us sang in English.

**Q:** Name the language spoken by the Maoris.

- 3) But they do not absorb significant amounts of infrared radiation, and thus do not contribute to the greenhouse effect.

**Q:** What does the term "they" refer to?

- 4) No, Your Highness, we wish to be your sons. We are not interested in ascending the throne.

**Q:** Who spoke this passage ?

- b) **Fill up the blanks and rewrite (5 Nos)**

(5x1=5 marks)

- i) The army moved from \_\_\_\_\_ forest towards Macbeth's castle

- ii) But it is this \_\_\_\_\_ and its misleadingly called greenhouse effect that makes life on earth possible

- iii) "What a tongue twister". I could not help saying.. "Oh, we call it \_\_\_\_\_ for short," said my host.

- iv) There is no need for a Maori house to have either a kitchen or \_\_\_\_\_

- v) Both of you possess \_\_\_\_\_ qualities

**c) Answer the following questions in one or two or sentences each:**

**(2x2=4marks)**

i) And it grew both day and night,

Till it bore an apple bright;

**Q:** What does the term 'it' refer to?

ii). And the thunder, like a breaking stick,

Stumbles about the hills.

**Q:** What is ' the thunder ' compared to?

iii). Will distant space look down on orb that's bald.

**Q:** Why does the poet say 'orb that's bald'?

**ENGINEERING MATHEMATICS - III**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV  
 Subject Code : 22002  
 Semester : II Semester  
 Subject Title : **ENGINEERING MATHEMATICS - III**

**TRAINING AND SCHEME OF EXAMINATION:**

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
Engineering Mathematics - III	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**Topics and Allocation of Hours:**

Sl.No.	Topic	Time (Hrs.)
1	Vector Algebra – I	14
2.	Vector Algebra – II	14
3.	Integration – I	14
4.	Integration – II	14
5.	Probability Distribution-I	14
	Tutorial	10
	Total	80

**Rationale:** Many of the physical problems in Engineering becomes differential equation when mathematical modeling is done. To solve these problems, integration, the strong tool in mathematics is utilized, which intends to give basic concepts of Integration.

**Objectives:** Acquires knowledge of mathematical terms, concepts, principles and different methods. Develop the ability to solve physical problems.

**LEARNING STRUCTURE:**

<b>Application</b>	Unit – I	Unit – II	Unit - III	Unit –IV	Unit - V
	Use of vectors in dynamics for calculation of force, moment velocity etc.		To find length of curve area, volumes surface area		Analysis of experimental data for estimation.
<b>Procedure</b>	To explain methods addition, subtraction, scalar multiplication of vector	To explain methods of vector and scalar multiplication of two, three and four vectors.	To explain methods for finding integral values of different function.	To explain methods for finding integral value of function using by parts and bernoulli's formula. Method to find definite integrals.	To find probability distribution of discrete random variable mean and variance using mathematical expectation.
<b>Concepts</b>	Addition and subtraction of vector, scalar product of two vectors, work done and projection.	Vector product of two vectors scalar and vector product of 3 and 4 vectors.	Integral of standard functions using reverse process of differentiation, decomposition & substitution methods.	Integration using by parts method and Bernoulli's Theorem. Definite integrals	Probability mass function, probability distribution Binomial distribution. Their mean and variance
<b>Facts</b>	Definition of vector modulus, position vector, direction cosine, direction ratio. Definition scalar product.	Definition of vector product.	Integration as reverse process. Decomposition using Trigonometrical relations.	Definition of definite Integral Its properties	Definition of probability. Probability axioms definition of random variable types – mathematical expectation mean and variance.

## DETAILED SYLLABUS

### CONTENTS

UNIT	NAME OF TOPICS	Hours	Mark
<b>I</b>	<b>VECTOR ALGEBRA – I</b> <b>1.1. INTRODUCTION:</b> Definition of vector - types, addition, and subtraction of Vectors, Properties of addition and subtraction. Position vector. Resolution of vector in two and three dimensions. Directions cosines, direction ratios. Simple problems.	5	8
	<b>SCALAR PRODUCT OF VECTORS</b> <b>1.2.</b> Definition of Scalar product of two vectors – Properties – Angle between two vectors. Simple Problems.	5	7
	<b>APPLICATION OF SCALAR PRODUCT</b> <b>1.3</b> Geometrical meaning of scalar product. Work done by Force. Simple Problems.	4	7
<b>II</b>	<b>VECTOR ALGEBRA – II</b> <b>VECTOR PRODUCT OF TWO VECTORS</b> <b>2.1</b> Definition of vector product of two vectors. Geometrical meaning. Properties – Angle between two vectors – unit vector perpendicular to two vectors. Simple Problems.	5	8
	<b>APPLICATION OF VECTOR PRODUCT OF TWO VECTORS &amp; SCALAR TRIPLE PRODUCT</b> <b>2.2.</b> Definition of moment of a force. Definition of scalar product of three vectors – Geometrical meaning – Coplanar vectors. Simple Problems.	5	7
	<b>PRODUCT OF MORE VECTORS</b> <b>2.3.</b> Vector Triple product. Scalar and vector product of four vectors. Simple Problems.	4	7
<b>III</b>	<b>INTEGRATION – I</b> <b>3.1. INTRODUCTION:</b> Definition of integration – Integral values using reverse process of differentiation – Integration using decomposition method. Simple Problems.	5	8
	<b>INTEGRATION BY SUBSTITUTION</b> Integrals of the form $\int [f(x)]^n f'(x) dx$ where $(n \neq -1)$ , $\int \frac{f'(x)}{f(x)} dx$ , $\int F[f(x)] f'(x) dx$ Simple Problems.	4	7

UNIT	NAME OF TOPICS	Hours	Mark
III	<b>STANDARD INTEGRALS</b> 3.3. Integrals of the form $\int \frac{dx}{a^2 \pm x^2}$ , $\int \frac{dx}{x^2 - a^2}$ , $\int \frac{dx}{\sqrt{a^2 - x^2}}$ , $\int \frac{Ax+B}{ax^2+bx+c}$ Simple Problems.	5	7
IV	<b>INTEGRATION – II</b> <b>INTEGRATION BY PARTS</b> 4.1. Integrals of the form $\int x \sin nx \, dx$ , $\int x \cos nx \, dx$ , $\int x e^{nx} dx$ , $\int x^n \log x \, dx$ , $\int \log x dx$ Simple Problems.	5	7
	<b>BERNOULLI'S FORMULA</b> 4.2. Evaluation of the integrals $\int x^m \cos nx \, dx$ , $\int x^m \sin nx \, dx$ , $\int x^m e^{nx} dx$ , when $m \leq 2$ using Bernoulli's formula. Simple Problems.	4	7
	<b>DEFINITE INTEGRALS</b> 4.3. Definition of definite Integral. Properties of definite Integrals. Simple Problems.	5	8
V	<b>PROBABILITY DISTRIBUTION-I</b> <b>RANDOM VARIABLE</b> 5.1. Definition of Random variable – Types – Probability mass function – Probability density function. Simple Problems.	5	8
	5.2. Mathematical Expectation of discrete random variable, mean and variance. Simple Problems.	4	7
	<b>BINOMIAL DISTRIBUTION</b> 5.3. Definition $P(X=x) = \begin{cases} nC_x p^x q^{n-x} & x=0,1,2,\dots, n \\ 0 & \text{other wise} \end{cases}$ Statement verify. Expression for mean and variance. Simple Problems.	5	7

**Text Book:**

Mathematics for Higher Secondary – I year and II year (Tamil nadu Text Book Corporation)

**Reference Book:**

Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai

Engineering Mathematics – Dr.P.Kandasamy & Others, S.Chand & Co Ltd, New Delhi

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**MODEL QUESTION PAPER - 1**  
**ENGINEERING MATHEMATICS – III**

Time three hours

(Maximum Marks: 75)

**PART – A**  
(Marks: 15 x 1 = 15)

Answer any fifteen (15) questions:

1. If position vectors of the points A and B are  $2\vec{i} + \vec{j} - \vec{k}$  and  $5\vec{i} + 4\vec{j} + 3\vec{k}$  find  $|\overline{AB}|$
2. If the vectors  $\vec{a} = 2\vec{i} - 3\vec{j}$  and  $\vec{b} = -6\vec{i} + m\vec{j}$  are collinear, find the value of m.
3. Define scalar product of two vectors.
4. Find the projection of the vector  $2\vec{i} + 3\vec{j} - \vec{k}$  on  $-2\vec{i} + 4\vec{j} - \vec{k}$
5. If  $\vec{a} = 2\vec{i} - \vec{j} + \vec{k}$  and  $\vec{b} = \vec{i} + 2\vec{j} + 3\vec{k}$  find  $\vec{a} \times \vec{b}$
6. Prove that  $(\vec{a} - \vec{b}) \times (\vec{a} + \vec{b}) = 2(\vec{a} \times \vec{b})$
7. Find the value of  $[\vec{i}, \vec{j}, \vec{k}]$
8. Find  $\vec{i} \times (\vec{j} \times \vec{k})$  and  $(\vec{i} \times \vec{j}) \times \vec{k}$
9. Evaluate  $\int (3x^2 - 5\sec^2 x + 7/x) dx$
10. Evaluate  $\int \sin^2 x dx$
11. Evaluate  $\int \frac{e^x}{e^x + 1} dx$
12. Evaluate  $\int \frac{1}{\sqrt{4x^2 - 25}} dx$
13. Evaluate  $\int x e^x dx$
14. Evaluate  $\int \log x dx$
15. Evaluate  $\int_1^3 3x^2 + 1 dx$
16. Evaluate  $\int_{-2}^2 x^3 dx$
17. Define discrete random variable.

18. A random variable X has the following probability distribution

X :	0	1	2	3	4
P(x) :	a	5a	3a	7a	4a

Find the value of a

19. A random variable X has the following probability distribution

X :	0	1	2	3
P(x) :	1/7	2/7	1/7	3/7

Find E(X)

20. Find the mean and variance of the binomial distribution given by

$$P(X=x) = {}^{10}C_x (1/4)^x (3/4)^{10-x} \quad \text{when } x=0,1,2,\dots,10$$

### PART - B

(Marks : 5 x 12 = 60)

[ N.B :- (1) Answer all questions choosing any two divisions from each question.

(2) All questions carry equal marks. ]

21 (a) Show that the points whose position vectors  $2\vec{i} + 3\vec{j} - 5\vec{k}$ ,  $3\vec{i} + \vec{j} - 2\vec{k}$  and  $6\vec{i} - 5\vec{j} + 7\vec{k}$  are collinear.

(b) Prove that the vectors are  $\vec{a} = \vec{i} + 2\vec{j} + \vec{k}$ ,  $\vec{b} = \vec{i} + \vec{j} - 3\vec{k}$  and , and  $\vec{c} = 7\vec{i} - 4\vec{j} + \vec{k}$  are mutually perpendicular..

(c) A particle acted on by the forces  $3\vec{i} - 2\vec{j} + 2\vec{k}$  and  $2\vec{i} + \vec{j} - 3\vec{k}$  is displaced from the point  $\vec{i} + 3\vec{j} - \vec{k}$  to the point  $4\vec{i} - \vec{j} + 2\vec{k}$ . Find the work done.

22 (a) Find the area of the triangle formed by the points whose position vectors are  $2\vec{i} + 3\vec{j} + 4\vec{k}$ ,  $3\vec{i} + 4\vec{j} + 2\vec{k}$ ,  $4\vec{i} + 2\vec{j} + 3\vec{k}$

(b) Find the magnitude of the moment about the point (1,-2,3) of a force  $2\vec{i} + 3\vec{j} + 6\vec{k}$  whose line of action passes through the origin

(c) If  $\vec{a} = \vec{i} + \vec{j}$ ;  $\vec{b} = \vec{j} + \vec{k}$ ;  $\vec{c} = \vec{k} + \vec{i}$ ;  $\vec{d} = \vec{i} + \vec{j} + \vec{k}$  verify that  $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = [\vec{a} \vec{d} \vec{b}] \vec{c} - [\vec{a} \vec{b} \vec{c}] \vec{d}$

23 (a) Integrate (i)  $\frac{\sin x}{1 + \cos x}$  (ii)  $\sin 7x \cos 5x$

(b) Evaluate (i)  $\int \frac{6x+5}{\sqrt{3x^2+5x+6}} dx$  (ii)  $\int \frac{e^{\tan x}}{\cos^2 x} dx$

(c) Evaluate  $\int \frac{1}{3x^2 - 13x - 10} dx$

24 (a) Evaluate (i)  $\int x^2 \log x dx$  (ii)  $\int x \cos 5x$

(b) Using Bernoulli's formula evaluate  
 (i)  $\int x^2 e^{2x} dx$  (ii)  $\int x^2 \cos 2x dx$

(c) Evaluate (i)  $\int_1^2 x^2 - 3\sqrt{x} + \frac{1}{x^2} dx$  (ii)  $\int_0^{\frac{\pi}{2}} \cos^2 \frac{x}{2} dx$

25 (a) A Random variable X has the following probability distribution

X	0	1	2	3	4	5
P(X)	a	3a	5a	7a	9a	11a

Find (i) Value of a (ii)  $P(X > 3)$  (iii)  $P(1 \leq x \leq 4)$

(b) The random variable X has the following probability distribution

X	0	1	2	3	4	5
P(x)	1/16	1/4	3/8	3/16	1/16	1/16

Find the mean and variance

(c) A perfect cube is thrown 8 times. The occurrence of 2 or 4 is called a success, find the probability of (i) 2 success (ii) atleast 2 successes.

\* \* \*

**MODEL QUESTION PAPER - 2**  
**ENGINEERING MATHEMATICS – III**

Time three hours

(Maximum Marks: 75)

**PART – A**

(Marks: 15 x 1 = 15)

1. If  $\vec{a} = 3\vec{i} - \vec{j} - 4\vec{k}$ ,  $\vec{b} = -2\vec{i} + 4\vec{j} - 3\vec{k}$  and  $\vec{c} = \vec{i} + 2\vec{j} - \vec{k}$ , find  $|2\vec{a} - \vec{b} + 3\vec{c}|$
2. Find the direction cosines of the vector  $2\vec{i} + 3\vec{j} - 4\vec{k}$
3. If  $\vec{a} = 5\vec{i} - \vec{j} - 6\vec{k}$ ,  $\vec{b} = -7\vec{i} + 3\vec{j} - 2\vec{k}$  find dot product of  $\vec{a}$  and  $\vec{b}$
4. State the formula to find work done by the force  $\vec{f}$  in displacing the particle from the point A to B.
5. Define vector product of two vectors.
6. If  $\vec{a}$  and  $\vec{b}$  are the two adjacent sides of a parallelogram, find its area.
7. Define scalar product of three vectors
8. Express  $(\vec{a} \times \vec{b}) \cdot (\vec{c} \times \vec{d})$  in the form of determinant.
9. Evaluate  $\int \sec^2(3 + 4x) dx$
10. Evaluate  $\int \sin 5x \cos 2x dx$
11. Evaluate  $\int \frac{2x}{1+x^2} dx$
12. Evaluate  $\int \frac{1}{16+x^2} dx$
13. Evaluate  $\int \log x dx$
14. Evaluate  $\int x \sin x dx$
15. Evaluate  $\int_2^3 3x^2 + 4 dx$
16. Evaluate  $\int_{-2}^2 (2x^3 + 5x) dx$
17. Define Random variable

18. A random variable X has the following the probability distribution

X	:	1	2	3	4	5
P(X)	:	1/16	5/16	3/16	3/16	1/4

Find P (X<3)

19. If E(X) = 5 and E (X<sup>2</sup>) = 35 find variance of X

20. In a binomial distribution, the mean and standard deviation are 12 and 2 respectively. Find p.

**PART – B**  
(Marks: 5 x 12 = 60)

[ N.B :- (1) Answer all questions choosing any two divisions from each question.

(2) All questions carry equal marks. ]

21 (a) Show that the points given by the vectors  $4\vec{i} + 5\vec{j} + \vec{k}$ ,  $-\vec{j} - \vec{k}$ ,  $3\vec{i} + 9\vec{j} + 4\vec{k}$  and  $-4\vec{i} + 4\vec{j} + 4\vec{k}$  are coplanar.

(b) Find the angle between the vectors  $3\vec{i} + 4\vec{j} + 12\vec{k}$  on  $\vec{i} + 2\vec{j} + 2\vec{k}$ .

(c) The work done by force  $\vec{F} = a\vec{i} + \vec{j} + \vec{k}$  in moving the point of application from  $\vec{i} + \vec{j} + \vec{k}$  to  $2\vec{i} + 2\vec{j} + 2\vec{k}$  along a straight line is given to be 5 units. Find the value of a.

22 (a) Find the angle and the unit vector perpendicular to both the vectors  $\vec{a} = \vec{i} + 2\vec{j} + 3\vec{k}$  and  $\vec{b} = \vec{i} - \vec{j} - \vec{k}$ .

(b) Find the moment about the point  $\vec{i} + 2\vec{j} - \vec{k}$  of a force represented by  $3\vec{i} + \vec{k}$  acting through the point  $2\vec{i} - \vec{j} - 3\vec{k}$ .

(c) Prove that  $[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}] = [\vec{a} \vec{b} \vec{c}]^2$

23 (a) Evaluate (i)  $\int (\tan x + \cot x)^2 dx$  (ii)  $\int \sqrt{1 + \sin 2x} dx$

(b) Evaluate (i)  $\int \tan^4 x \sec^2 x dx$  (ii)  $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

(c) Evaluate  $\int \frac{4x-3}{x^2+6x+8} dx$

24 (a) Evaluate (i)  $\int x \log x dx$  (ii)  $\int x \cos 5x dx$

(b) Using Bernoulli's formula evaluate

(i)  $\int x^2 e^{2x} dx$       (ii)  $\int x^2 \cos 2x dx$

(c) Evaluate (i)  $\int_0^1 \frac{e^{\tan^{-1} x}}{1+x^2} dx$       (ii)  $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$

25 (a) Show that  $f(x) = \frac{2}{\sqrt{1-x^2}}$   $-1 < x < 1$ , is a probability density function.

(b) A random variable X has the following probability distribution

X :	0	1	2	3
P(X) :	1/8	3/8	3/8	1/8

Find  $E(2X+3)^2$

(c) Four coins are tossed simultaneously. What is the probability of getting (a) exactly 2 heads (b) at least two heads (c) at most two heads.

\* \* \*

**ENGINEERING MATHEMATICS - IV**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **22003**

Semester : II Semester

Subject Title : **ENGINEERING MATHEMATICS – IV**

**TRAINING AND SCHEME OF EXAMINATION:**

No. of Weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
Engineering Mathematics - IV	5 Hrs.	80 Hrs.	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**Topics and Allocation of Hours:**

Sl.No.	Topic	Time (Hrs.)
1	Complex Numbers – I	14
2.	Complex Numbers – II	14
3.	Probability Distribution-II	14
4.	Application of Integration and differential equation	14
5.	Second order differential equation	14
	Tutorial	10
	Total	80

**Rationale:** The study of mathematics is very much needed , as the new disciplines like, information technology, genetics engineering, biotechnology, mechatronics etc are based on mathematics. This subject is the extension of other mathematic subjects studied in first and second semester and is the stepping stone to learn applied mathematics.

**Objectives:** At the end of the training programme the student will be able to solve polynomial equations with complex solutions, and solve the physical problems in fluid dynamics and circuit theory using the concept of differential equations.

**LEARNING STRUCTURE:**

<b>Application</b>	Unit – I	Unit – II	Unit – III	Unit –IV	Unit - V
	To solve polynomial equations with complex root in the Engineering problem.		To Estimate, in industries, from the available information	To solve differential equations arising in Electrical and Electronics Engineering.	
<b>Procedure</b>	To explain method to evaluate algebra of complex numbers in cartesian and polar form	To explain the use of Demoivre’s Theorem in evaluating of multiplication and division of complex number and method to solve polynomial equation.	To find probabilities using Poisson and normal distributions fitting a straight line using given data.	To find area under curve volume generated by curves using integration. Solution of differential equation using Integration.	To explain the method to find complimentary function and particular integral and hence solution of differential equation.
<b>Concepts</b>	Algebra of complex numbers, relation between Cartesian and polar form of complex numbers. Complex number as a point on the Argand plane.	To explain the method to use Demoivre’s Theorem for evaluation of multiplication and division of complex numbers.	Method to find probability using Poisson and normal distribution. Method to fit straight using least square method.	Area of circle volume of cone and sphere. Method to solve variable separable and linear type.	Solution of second order differential equation as sum of complimentary function and particular integral.
<b>Facts</b>	Definition of complex numbers, conjugates modulus amplitude Argand plane.	Demoivre’s Theorem root of complex number using Demoivre’s Theorem.	Definition of Poisson and normal distribution Basics of curve fitting.	Area and volume using integration. Order and degree of differential equation.	Concept of second order Differential Equation

## DETAILED SYLLABUS

### CONTENTS

UNIT	NAME OF TOPICS	Hours	Mark
I	<b>COMPLEX NUMBERS – I</b> 1.1. Definition – Conjugates - Algebra of complex numbers (geometrical proof not needed) – Real and Imaginary parts. Simple Problems.	5	8
	1.2. Polar form of complex number – Modulus and amplitude form multiplication and division of complex numbers in polar form. Simple Problems	5	7
	1.3 Argand plane – Collinear points, four points forming square, rectangle, rhombus. Simple Problems.	4	7
II	<b>COMPLEX NUMBERS – II</b> 2.1 Demoiivre’s Theorem (statement only) – simple problems.	4	7
	2.2. Demoiivre’s Theorem related problems. Simple Problems.	5	7
	2.3 Finding the n <sup>th</sup> roots of unity - solving equation of the form $x^n \pm 1 = 0$ where $n \leq 7$ . Simple Problems.	5	8
III	<b>PROBABILITY DISTRIBUTION - II</b> <b>POISSON DISTRIBUTION</b> 3.1. Definition – $P(X=x) = \frac{e^{-\lambda} \lambda^x}{x!}$ $x=0,1,2,\dots$  (Statement only). Expression for mean and variance. Simple Problems.	5	8
	<b>NORMAL DISTRIBUTION</b> 3.2 Definition of normal and standard normal distribution. (Statement only). Constants of normal distribution (results only) – Properties of normal distribution – Simple Problems using the table for standard normal distribution.	5	7
	<b>CURVE FITTING</b> 3.3. Fitting of straight line using least square method (Result only) Simple Problems	4	7
IV	<b>APPLICATION OF INTEGRATION AND FIRST ORDER DIFFERENTIAL EQUATION</b> <b>AREA AND VOLUME</b> 4.1. Area – Area of circle, Volume – Volume of cone and sphere. Simple Problems.	5	7
	<b>FIRST ORDER DIFFERENTIAL EQUATION</b> 4.2. Definition of order and degree of differential equation – Solution of first order variable separable type differential equation. Simple Problems.	5	8
	<b>LINEAR TYPE DIFFERENTIAL EQUATION</b> 4.3. Solution of linear differential equation. Simple Problems.	4	7

<b>V</b>	<b>SECOND ORDER DIFFERENTIAL EQUATIONS</b>		
	<b>5.1</b> Solution of second order differential equations with constant coefficients in the form $a \frac{d^2y}{dx^2} + b \frac{dy}{dx} + cy = o$ . Simple Problems.	4	7
	<b>5.2</b> Solution of second order differential equations in the form $a \frac{d^2y}{dx^2} + b \frac{dy}{dx} + cy = f(x)$ where a , b and c are constants and $f(x) = e^{mx}$ . Simple Problems.	5	8
<b>5.3.</b> Solution of second order differential equation in the form $a \frac{d^2y}{dx^2} + b \frac{dy}{dx} + cy = f(x)$ where a, b and c are constants and $f(x) = \sin mx$ or $\cos mx$ . Simple Problems.	5	7	

**Text Book:**

Mathematics for Higher Secondary – I year and II year (Tamil nadu Text Book Corporation)

**Reference Book:**

Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai

Engineering Mathematics – Dr.P.Kandasamy & Others, S.Chand & Co Ltd, New Delhi

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**MODEL QUESTION PAPER – 1**  
**ENGINEERING MATHEMATICS- IV**

Time --- three hours

(Maximum Marks: 75)

**PART – A**

(Marks: 15 x 1 = 15)

Answer any fifteen (15) questions:

1. Find the value of  $i^2 + i^3 + i^4$
2. If  $z_1 = 1 + i$ ,  $z_2 = 3 + 2i$  the find  $3z_1 + 4z_2$ .
3. Find the modulus and amplitude of  $\frac{1}{2} + i\frac{\sqrt{3}}{2}$
4. Find the distance between the complex numbers  $2 + i$  and  $1 - 2i$ .
5. Find the value of  $(\cos\theta + i\sin\theta)^2(\cos 3\theta + i\sin 3\theta)^{-3}$
6. If  $x = (\cos\theta + i\sin\theta)$ , what is the value of  $x^m + 1/x^m$
7. If  $\omega$  is a cube root of unity, then find the value of  $1 + \omega^2 + \omega^4$ .
8. Simplify  $(1 + \omega)(1 + \omega^2)$
9. If the mean of the Poisson distribution is 2, find  $P(X=0)$ .
10. Give two examples of Poisson distribution.
11. State the normal distribution.
12. Write down the normal equations to fit a straight line  $y = ax + b$ .
13. Find the area bounded by the curve  $y = x^2$  and x-axis between  $x = 0$  and  $x = 2$ .
14. Solve  $x dx + y dy = 0$ .
15. Find the solution of  $\frac{dy}{dx} + y \sin x = 0$ .
16. Find the integrating factor of  $\frac{dy}{dx} - y \cot x = \sin x$ .
17. Find the solution of  $(D^2 - 1)y = 0$
18. Find the complementary function of  $(D^2 + 1)y = e^{2x}$
19. Find the particular integral of  $(D^2 + 5D + 6)y = 13$
20. Find the auxiliary equation of  $(D^2 + 9)y = \sin 4x$

**PART - B**

(Marks: 5 x 12 = 60)

- [ N.B :- (1) Answer all questions choosing any two divisions from each question.  
(2) All questions carry equal marks. ]

- 21 (a) Find the real part and imaginary part of the complex number  $\frac{(1+i)(2-i)}{1+3i}$   
(b) Find the modulus and amplitude of the complex number  $\frac{1+\sqrt{3}i}{1+i}$

(c) Show that the complex numbers  $(2 - 2i)$ ,  $(8 + 4i)$ ,  $(5 + 7i)$ ,  $(-1 + i)$  form a rectangle.

22 (a) Simplify  $\frac{(\cos 2\theta + i \sin 2\theta)^2 (\cos 3\theta - i \sin 3\theta)^4}{(\cos 3\theta + i \sin 3\theta)^2 (\cos 4\theta + i \sin 4\theta)^{-2}}$

(b) If  $n$  is a positive integer, prove that  $(\sqrt{3} + i)^n - (\sqrt{3} - i)^n = 2^{n+1} \cos \frac{n\pi}{6}$

(c) Solve:  $x^7 + 1 = 0$

23 (a) In a Poisson distribution if  $P(X=3) = P(X=2)$  find  $P(X=0)$  and  $P(X=1)$ .

(b) If  $X$  is normally distributed with mean 80 and standard deviation 10 find  $P(70 \leq x \leq 100)$ .

(c) Fit a straight line for the following data.

X	0	1	2	3	4
Y	10	14	19	26	31

24 (a) Find the volume of a right circular cone of base radius  $r$  and altitude  $h$  by Integration.

(b) Solve  $\frac{dy}{dx} + \frac{1 + \cos 2y}{1 + \cos 2x} = 0$

(c) Solve  $\frac{dy}{dx} + y \cot x = 4x \operatorname{cosec} x$

25 (a) Solve :  $(D^2 + 36)y = 0$  when  $x = 0$ ,  $y = 2$  and when  $x = \frac{\pi}{2}$ ,  $y = 3$

(b) Solve :  $(3D^2 + D - 14)y = 13e^{2x}$

(c) Solve  $(D^2 - 5D + 6)y = 2\cos 3x$

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**MODEL QUESTION PAPER – 2**  
**ENGINEERING MATHEMATICS – IV**

Time --- three hours

(Maximum Marks: 75)

**PART – A**

(Marks: 15 x 1 = 15)

Answer any fifteen (15) questions

1. Find the conjugate of  $(1 + i)(1 - 2i)$ .
2. If  $z_1 = 2 + i$ ,  $z_2 = 3 - 2i$  the find  $z_1/z_2$
3. Find the quadratic equation whose root is  $3 - 2i$ .
4. Find the distance between the complex numbers  $2 - i$  and  $5 - 2i$
5. State De Moivre's theorem.
6. Simplify  $\frac{\cos 3\theta + i \sin 3\theta}{\cos 4\theta - i \sin 4\theta}$
7. If  $\omega$  is a cube root of unity, find the value of  $\omega^4 + \omega^5 + \omega^6$ .
8. Solve  $x^2 + 16 = 0$
9. If the mean of Poisson distribution is 1 state its probability distribution.
10. How many values does the Poisson variable take?
11. If  $Z$  is the standard normal variable find the value of  $\int f(z) dz$
12. State the normal equations to fit the straight line  $y = mx + c$
13. Find the area bounded by the curve  $y = x^3$  and  $x$  axis between  $x = 0$  and  $x = 1$ .
14. Write the order and degree of the differential equation  $y' = x \frac{dy}{dx} + \left(\frac{dy}{dx}\right)^2$
15. Find the solution of  $\frac{dy}{dx} = 2xy$  -∞
16. Find the integral factor of  $\frac{dy}{dx} + \frac{2xy}{1+x^2} = 1+x^3$
17. Solve  $(D^2 + 9)y = 0$
18. Find the particular integral of  $(D^2 - 3D + 2)y = e^{-x}$
19. Find the complimentary function of  $(D^2 - 5D + 6)y = e^x$
20. Find the particular integral of  $(D^2 + 25)y = \cos x$

**Part - B**

(Marks : 5 x 12 = 60)

[ N.B :- (1) Answer all questions choosing any two divisions from each question.  
 (2) All questions carry equal marks. ]

- 21 (a) Find the real and imaginary parts of conjugate of the complex number  $\frac{(1+i)(2-i)}{(2+i)^2}$
- (b) Find the modulus and amplitude of the complex number  $\sqrt{3} - i$
- (c) Show that the complex numbers  $(9 + i)$ ,  $(4 + 13i)$ ,  $(-8 + 8i)$ ,  $(-3 - 4i)$  form a Square.

22 (a) Simplify  $\frac{(\cos 2\theta - i \sin 2\theta)^4 (\cos 4\theta + i \sin 4\theta)^{-\frac{1}{2}}}{(\cos 3\theta + i \sin 3\theta)^2 (\cos 5\theta - i \sin 5\theta)^{-\frac{1}{2}}}$

(b) If  $a = \cos 2\alpha + i \sin 2\alpha$ ,  $b = \cos 2\beta + i \sin 2\beta$ ,  $c = \cos 2\gamma + i \sin 2\gamma$ , prove that

(i)  $\sqrt{abc} + \frac{1}{\sqrt{abc}} = 2\cos(\alpha + \beta + \gamma)$  (ii)  $\frac{a^2 b^2 + c^2}{abc} = 2\cos 2(\alpha + \beta - \gamma)$

(c) Solve  $x^5 + 1 = 0$

23 (a) If 3% of electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs exactly 5 are defective.

(b) The mean score of 1000 students in an examination is 36 and standard deviation is 16.

If the score of the students is normally distributed how many students are expected to score more than 60 marks.

(d) Using the method of least squares fit the straight line

X	0	1	2	3	4
Y	1	1	3	4	6

24 (a) Find the volume of a sphere of radius  $r$  by Integration.

(b) Solve  $(1 - e^x) \sec^2 y dy + 3e^x \tan y dx = 0$

(c) Solve  $(1 + x^2) \frac{dy}{dx} + y = 1$

25 (a) Solve :  $(D^2 + D + 1)y = 0$

Solve :  $(D^2 - 13D + 12)y = 2e^{-2x} + 5$

(b) Solve :  $(D^2 + 16)y = \sin 9x$

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**ENGINEERING PHYSICS - II**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS**  
**L-SCHEME**  
**(Implements from the Academic year 2011-2012 onwards)**

Course Name : All branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV  
 Subject Code : **22004**  
 Semester : II Semester  
 Subject Title : **ENGINEERING PHYSICS - II**

**TEACHING AND SCHEME OF EXAMINATION:**

**No of weeks per semester: 16 weeks**

Subject	Instructions		Examination			Duration
	Hours /Week	Hours /Semester	Marks			
ENGINEERING PHYSICS-II	4 Hrs	64 Hrs	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

**Topics and Allocation of Hours:**

Sl.No.	Topic	Time(Hrs)
1.	HEAT	12
2.	THERMODYNAMICS, LIQUEFACTION OF GASES & NON-CONVENTIONAL ENERGY	13
3.	LIGHT AND REMOTE SENSING	13
4.	ELECTRICITY	13
5.	BASICS OF ELECTRONICS	13
Total		64

**RATIONALE:**

The exponential growth of Engineering and Technology has benefited the mankind with extreme sophistication and comfort. To sustain this development, continuous research and development should take place not only in Engineering and Technology but also in Basic Science such as Physics.

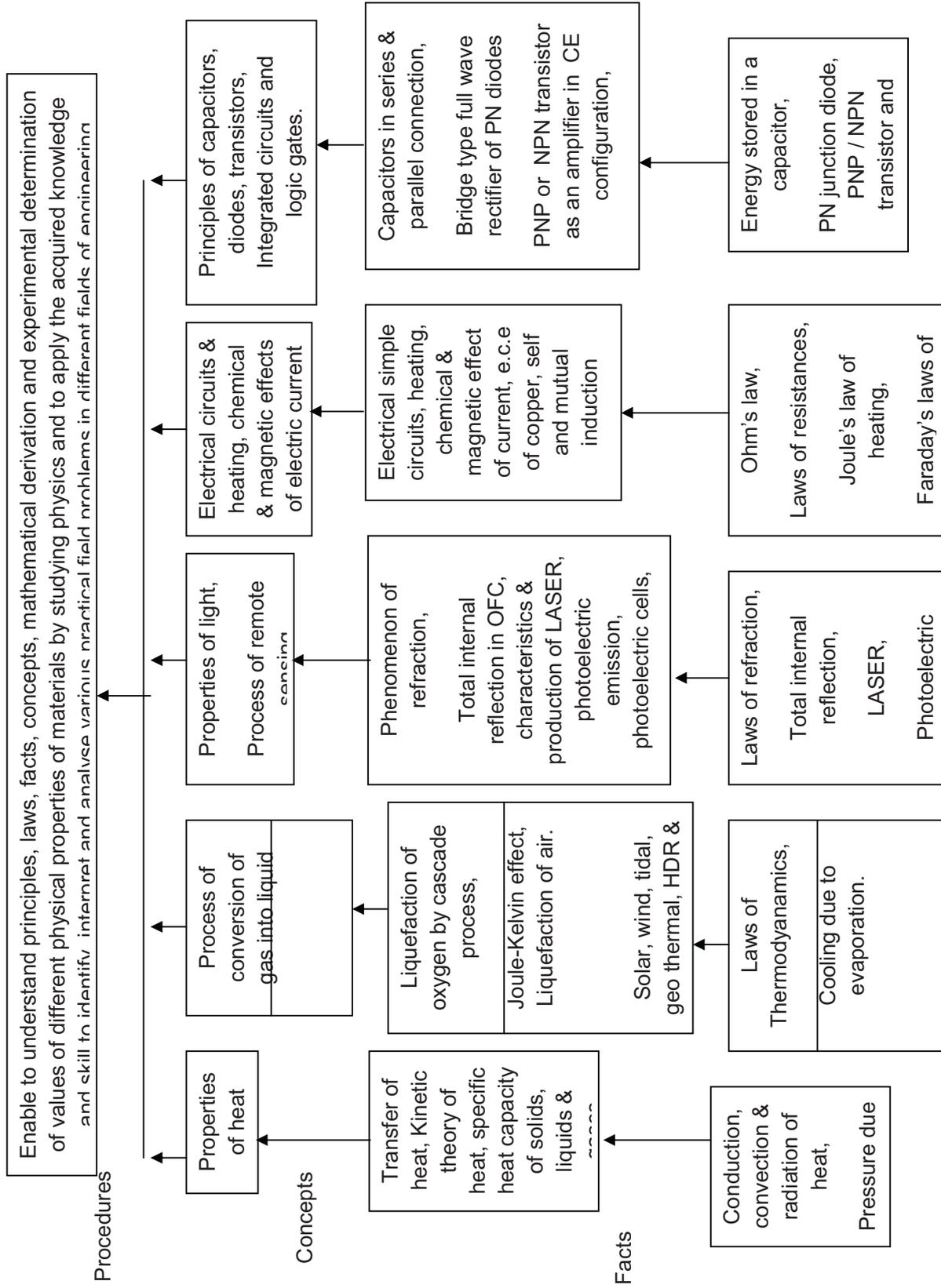
The various divisions of Physics like Optics, Acoustics, Dynamics, Semiconductor Physics, Surface Physics, Nuclear Physics, Energy Studies, Materials Science, etc provide the foundation by enlightening the **Fundamental facts, Principles, Laws and Correct sequence of events** to develop the Engineering and Technology field for the prosperity of human beings.

## **OBJECTIVES :**

At the end of the study of II Semester the student will be able to

- Identify good conductors and insulators of heat.
- Analyse the relation between pressure, volume and temperature of gas and to interpret the results.
- Understand the process of Isothermal and Adiabatic changes of gas and basic laws of thermodynamics.
- Acquire knowledge about liquefaction process of gases.
- Realise the inevitable need for tapping Alternate energy to address the looming energy crisis.
- Identify the characteristics and properties of LASER, Photo Electric effect and Optical fibre cable and their engineering applications.
- Acquire broader ideas about the process of remote sensing in tapping the earth resources for human benefits.
- Acquire knowledge about heating, chemical and magnetic effects of electric current.
- Understand the effect of self induction and mutual induction.
- Gain broader ideas of capacitors, diodes, transistors, integrated circuits and logic gates.
- Identify, analyse and solve Engineering field related problems involving expressions derived in all the above topics.

**Learning structure:**  
Applications





Unit	Name of the Topic	Hours	Marks
II	<p><b>2.3 NON – CONVENTIONAL ENERGY</b> Introduction – Non-renewable and Renewable (Alternate) energy sources – Examples – Solar energy, wind energy, tidal energy, geothermal energy, Hot Dry Rocks (HDR) and bio-mass – Advantages and disadvantages of renewable energy.</p>	5 Hrs	
III	<p><b>LIGHT AND REMOTE SENSING</b></p> <p><b>3.1 OPTICAL FIBRE CABLE</b> Refraction – Laws of refraction – Refractive index of a medium / material – Definition – Fibre optics – Introduction – Phenomenon of total internal reflection – Application of total internal reflection in Optical Fibre Cable (OFC) as a wave guide – Advantages of O.F.C.</p> <p><b>3.2 LASER</b> LASER – Characteristics of LASER – principle of LASER – Spontaneous emission – Stimulated emission – population inversion – Production of LASER using semiconductor (GaAs) diode source – Uses of LASER.</p> <p><b>3.3 PHOTO ELECTRIC EFFECT</b> Photo electric effect – Introduction – Hallwachs experimental arrangement – Einstein’s photoelectric equation – Laws of photoelectric emission – Photo emissive cell – Photo conductive cell – Photo voltaic cell – Applications of photo cells.</p> <p><b>3.4 REMOTE SENSING</b> Remote sensing – Introduction – Active and passive remote sensing – Explanation and examples – Components of remote sensing – Data acquisition, data analysis and reference data – Components of electro magnetic spectrum used in remote sensing – Microwave remote sensing – RADAR – principle and working with block diagram.</p>	<p>3 Hrs</p> <p>3 Hrs</p> <p>3 Hrs</p> <p>4 Hrs</p>	15
IV	<p><b>4.1 ELECTRICAL CIRCUITS</b> Ohm’s law – Laws of resistances – Resistivity and Conductivity – Definitions – Kirchoff’s current and voltage laws – Condition for balancing the Wheatstone’s network . Simple problems based on expression for resistivity.</p> <p><b>4.2 HEATING AND CHEMICAL EFFECTS OF CURRENT</b> Joule’s law of heating – Experimental determination of specific heat capacity of a liquid using Joule’s calorimeter – Faraday’s laws of electrolysis – Electro chemical equivalent (e.c.e) of an element – Definition – Experimental determination of e.c.e. of copper. Simple problems based on expression for e.c.e.</p>	<p>3 Hrs</p> <p>3 Hrs</p>	15

Unit	Name of the Topic	Hours	Marks
IV	<b>4.3 MEASURING INSTRUMENTS</b> Motion of a charged particle inside a uniform magnetic field – Expression for the force acting on a current carrying straight conductor placed in a uniform magnetic field – Fleming’s Left Hand rule – Expression for the torque experienced by a rectangular current carrying coil placed inside a uniform magnetic field – Working of a moving coil galvanometer and its merits – Conversion of galvanometer into an Ammeter and Voltmeter. Simple problems based on conversion of galvanometer into ammeter and voltmeter.	5 Hrs	
	<b>4.4 ELECTRO MAGNETIC INDUCTION</b> Faraday’s laws of electro magnetic induction – Lenz’s law – Fleming’s Right Hand Rule – Self induction and mutual induction.	2 Hrs	
V	<b>BASICS OF ELECTRONICS</b> <b>5.1 CAPACITORS</b> Capacitance of a capacitor – Definition – ‘ farad ’– Definition – Energy stored in a capacitor – Expressions for effective capacitance when capacitors are connected in series and parallel – Applications of capacitors. Simple problems based on expressions for effective capacitance for series and parallel connections of capacitors.	3 Hrs	15
<b>5.2 SEMI CONDUCTORS</b> Semi conductors – Energy bands in solids – Energy band diagram of good conductors, insulators and semi conductors – Concept of Fermi level - Intrinsic semiconductors - Concept of positive holes - Doping – Extrinsic semiconductors – P type and N type semiconductors.	3 Hrs		
<b>5.3 DIODES AND TRANSISTORS</b> P-N junction diode – Forward bias and reverse bias – Rectification action of diode – Working of full wave rectifier using P N junction diodes in bridge type configuration. PNP and NPN transistors – Three different configurations – Advantages of common emitter configuration – Working of NPN / PNP transistor as an amplifier in common emitter configuration.	4 Hrs		
<b>5.4 DIGITAL ELECTRONICS</b> Digital electronics – Introduction – Logic levels – Basic logic gates: OR, AND and NOT gates – Universal logic gates: NAND and NOR gates – Special logic gates: XOR and XNOR gates – Symbolic representation, Boolean expression and Truth table for all above logic gates – Integrated circuits – Levels of integration – SSI, MSI, LSI and VLSI.	3 Hrs		

**Text Book** : 1) Physics – Higher secondary – First & Second year– Volume I & II – TamilNadu Text Book Corporation - 2004 & 2005.  
2) Intermediate physics – Volume I & II – Anwar Kamal – Foundation books Private Ltd. – 2008

**Reference Book** : 1) Fundamentals of physics – Brijlal and Subramaniam.  
2) Fundamentals of Electricity – D.N. Vasudeva – S. Chand & co  
3) Non- Conventional energy sources – G.D. Rai.- Khanna publishers.  
4) Text book of Remote sensing and Geographical information systems – M. Anji Reddy BS publications.

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**II SEMESTER**  
**22004 - ENGINEERING PHYSICS – II**  
**MODEL QUESTION PAPER - 1**

Time : 3 Hrs  
PART- A

Max Marks : 75

Marks 15 x 1 = 15

**Note :** Answer any 15 Questions.- All questions carry equal marks

1. Define convection.
2. Define co-efficient of thermal conductivity.
3. Write the expression for root mean square velocity of molecules.
4. Define specific heat capacity of a substance.
5. Write First Law of thermodynamics.
6. Define isothermal change.
7. Define temperature of inversion.
8. Write any two advantages of renewable energy.
9. Write the Snell's law of refraction.
10. What is population inversion?
11. Write any two applications of photoelectric cells.
12. What is remote sensing?
13. Define resistivity.
14. Write Joule's law of heating.
15. Write Fleming's Left Hand Rule.
16. Define mutual induction.
17. Define ' farad '.
18. What is a ' hole ' ?
19. Write the three possible configurations in which a transistor can be connected.
20. Write the various levels of integration.

**PART- B**

Marks 5 x 12 = 60

**Note :** i) Answer all Questions choosing any two sub divisions from each question.  
ii) All sub divisions carry equal marks.

- I
  - a) List the properties of thermal radiation.
  - b) Derive an expression for the pressure of a gas on the basis of postulates of kinetic theory of gases.
  - c) The ratio of specific heat capacities of a gas is 1.66. Assuming the value of universal gas constant R as  $8.12 \text{ JK}^{-1} \text{ mol}^{-1}$ , find the values of specific heat capacity at constant pressure and specific heat capacity at constant volume of the gas.
- II
  - a) 10 litres of gas at 5 atmospheric pressure is suddenly compressed to half of its initial volume. Find the resulting pressure, assuming  $\gamma = 1.667$ .
  - b) Explain the cascade process of liquefaction of oxygen.
  - c) Explain solar energy, wind energy and tidal energy.
- III
  - a) Explain the application of total internal reflection in optical fibre cable as a waveguide.
  - b) Explain the production of LASER using a Semiconductor diode source.
  - c) Explain the working principle of RADAR with a block diagram.
- IV
  - a) Derive the condition for balancing Wheatstone's network.

- b) Derive an expression for the torque acting on a rectangular current carrying coil placed in a uniform magnetic field.
- c) A Galvanometer of resistance  $75\Omega$  shows full scale deflection for a current of  $100\text{mA}$ . How will you convert it into i) an ammeter to read a maximum of  $5\text{A}$  and ii) a voltmeter to read a maximum of  $10\text{V}$  ?
- V**
- a) Three capacitors of values  $10\mu\text{F}$ ,  $20\mu\text{F}$  and  $30\mu\text{F}$  are used in a circuit. Find the effective capacitance when they are connected i) in series and ii) in parallel.
- b) Explain the working of a Full Wave rectifier with a neat circuit diagram using **P-N junction** diodes in bridge type Configuration.
- c) Explain the working of a NPN transistor as an amplifier in common emitter configuration, with a neat circuit diagram.

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**II SEMESTER**  
**22004 - ENGINEERING PHYSICS – II**  
**MODEL QUESTION PAPER - 2**

Time : 3 Hrs

**PART-A**

Max Marks : 75  
Marks 15 x 1 = 15

**Note :** Answer any 15 Questions. – All questions carry equal marks

1. What is conduction?
2. Write any two properties of thermal radiation.
3. What is the relation between the pressure and kinetic energy of a gas?
4. Define specific heat capacity of a gas at constant pressure.
5. Write Clausius statement of second law of thermodynamics.
6. What is adiabatic change?
7. What is the principle of Cascade process?
8. What is solar energy?
9. Define refractive index of a medium.
10. Write any two advantages of Optical Fibre Cable.
11. Write Einstein's photoelectric equation and explain each term in that equation.
12. Expand the acronym RADAR.
13. Write the statement of Ohm's law.
14. Write Faraday's first law of electrolysis.
15. What is shunt?
16. Write the statement of Lenz's law.
17. Write any two applications of capacitors.
18. What is doping?
19. Define rectification.
20. Draw the symbolic representation of NAND gate and write its Boolean expression.

**PART- B**

Marks 5 x 12 = 60

**Note :** i) Answer all Questions choosing any two sub divisions from each question.  
ii) All sub divisions carry equal marks.

- I a) Explain the selection of good and poor thermal conductors based on their thermal Conductivities.  
b) The density of a gas is  $1.25 \text{ kg m}^{-3}$  at N.T.P. Find the Root mean square velocity of its molecules.  
c) Derive Meyer's relation  $C_p - C_v = R$ .
- II a) 9 litres of a gas at 1 atm pressure is compressed slowly to pressure of 3 atm. Find the resulting volume.  
b) Explain liquefaction of air by Linde's process.  
d) Explain geothermal energy and biomass.
- III a) Explain spontaneous and stimulated emissions.

- b) Explain the working of photo emissive cell and photo voltaic cell.
- c) Explain the components of remote sensing.
- IV**
  - a) Calculate the length of the wire required to make a 10 ohm resistance, if the radius of the wire is 0.25 mm and the resistivity of the material of the wire is  $1 \times 10^{-6} \Omega \text{ m}$ .
  - b) Describe an experiment to determine the electro chemical equivalent of copper using Copper voltameter.
  - d) Describe the construction and working of a moving coil galvanometer.
- V**
  - a) Derive an expression for effective capacitance when capacitors are connected in Parallel.
  - b) Explain the energy band diagram of good conductors, insulators and semiconductors.
  - c) Explain various levels of integration.

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**ENGINEERING PHYSICS – II PRACTICAL**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **22007**

Semester : II Semester

Subject Title : **ENGINEERING PHYSICS – II PRACTICAL**

**TEACHING AND SCHEME OF EXAMINATION:**

**No of weeks per Semester: 16 weeks**

Subject	Instructions		Examination			Duration
	Hours /Week	Hours /Semester	Marks			
			Internal Assessment	Board Examination	Total	
<b>ENGINEERING PHYSICS – II PRACTICAL</b>	<b>2 Hrs</b>	<b>32 Hrs</b>	<b>25</b>	<b>75</b>	<b>100</b>	<b>3 Hrs</b>

**RATIONALE:**

In Diploma level Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

**GUIDELINES:**

- All the Ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling Instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than three students while admitting a batch of 30 students during Board Examinations.

**ALLOCATION OF MARKS**

Formula with explanation	10 marks
Figure / Circuit diagram with parts	05 marks
Tabulation with proper units	10 marks
Observation (including taking readings)	35 marks
Calculation	10 marks
Result	05 marks
<b>Total</b>	<b><u>75 Marks</u></b>

## SECOND SEMESTER

### 22007 ENGINEERING PHYSICS - II PRACTICAL

#### LIST OF EXPERIMENTS WITH OBJECTIVES:

1. REFRACTIVE INDEX  
To determine the refractive index of a transparent liquid (water) using travelling microscope.
2. SPECTROMETER.  
To measure the angle of the prism and the angle of minimum deviation using spectrometer and to calculate the refractive index of glass.
3. SOLAR CELL.  
To draw the V – I characteristics of the solar cell.
4. LAWS OF RESISTANCES.  
To verify the laws of resistances by connecting the two given standard resistances (i) in series and (ii) in parallel, using Ohm's law.
5. METRE BRIDGE.  
To determine the unknown resistance of the given wire.
6. POTENTIOMETER.  
To compare the electro motive forces (e.m.fs) of the given two cells.
7. JOULE'S CALORIMETER.  
To determine the specific heat capacity of water.
8. COPPER VOLTAMETER.  
To determine the electro chemical equivalent (e.c.e.) of copper.
9. P-N JUNCTION DIODE.  
To draw the voltage – current characteristics in forward bias and to find the 'dynamic forward resistance' & 'knee voltage' from the graph.
10. LOGIC GATES.  
To find the output conditions for different combinations of the input for NOT gate and 2 inputs AND, OR, NAND & NOR logic gates, using IC chips. ( IC 7404 –NOT Gate, IC 7408 – AND Gate, IC 7432 – OR gate, IC 7400 – NAND Gate, IC 7402 – NOR Gate)

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**SECOND SEMESTER**  
**22007 ENGINEERING PHYSICS - II PRACTICAL**  
**LIST OF EQUIPMENT**

1. REFRACTIVE INDEX  
Travelling Microscope, Beaker with transparent liquid and Saw dust.
2. SPECTROMETER.  
Spectrometer, Sodium vapour lamp, Reading lens and Glass prism
3. SOLAR CELL.  
Solar cell Kit for drawing the V - I characteristics
4. LAWS OF RESISTANCES.  
Battery Eliminator, key, rheostat, ammeter, voltmeter, Connecting wires and two known standard resistances.
5. METRE BRIDGE.  
Meter Bridge, variable resistance box, Leclanche cell, plug Key, galvanometer, high resistance, jockey, connecting Wires and unknown resistance.
6. POTENTIOMETER.  
Potentiometer, two cells (Leclanche cell and Daniel cell), Battery eliminator, Rheostat, Key, two way key, Galvanometer, high resistance, jockey and connecting wires
7. JOULE'S CALORIMETER.  
Joule's Calorimeter, Battery eliminator, Rheostat, Key, Ammeter, voltmeter, stop clock, thermometer, digital Balance and connecting wires.
8. COPPER VOLTAMETER.  
Copper Voltameter, Battery eliminator, Rheostat, Key, Ammeter, stop clock, digital balance, emery sheet and Connecting wires.
9. P-N JUNCTION DIODE.  
P-N Junction Diode forward characteristics kit
10. LOGIC GATES.  
Logic gates testing apparatus kit with bread board for Mounting ICs and Integrated circuit chips ( IC 7404 –NOT Gate, IC 7408 – AND Gate, IC 7432 – OR gate, IC 7400 – NAND Gate, IC 7402 – NOR Gate)

## **SECOND SEMESTER**

### **22007 ENGINEERING PHYSICS - II PRACTICAL**

#### **MODEL QUESTION PAPER**

1. Determine the refractive index of the given transparent liquid using traveling microscope.
2. Draw the V – I characteristics of the solar cell.
3. Measure the angle of the prism and the angle of minimum deviation using spectrometer and then calculate the refractive index of glass.
4. Verify the laws of resistances by connecting the two given standard resistances (i) in series and (ii) in parallel, using Ohm's law.
5. Determine the unknown resistance of the given wire, using metre bridge.
6. Compare the electro motive forces (e.m.fs) of the given two cells, using potentiometer.
7. Determine the specific heat capacity of water, using Joule's calorimeter.
8. Determine the electro chemical equivalent (e.c.e.) of copper using Copper Voltmeter.
9. Draw the voltage – current characteristics of a P-N junction diode in forward bias and then find the 'dynamic forward resistance' & 'knee voltage' from the graph.
10. Find the output conditions for different combinations of the input for NOT gate and 2 inputs AND, OR, NAND & NOR logic gates using IC chips.

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**ENGINEERING CHEMISTRY - II**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **22005**

Semester : II Semester

Subject Title : **ENGINEERING CHEMISTRY - II**

**TEACHING AND SCHEME OF EXAMINATION:**

**No. of Weeks per Semester: 16 Weeks**

Subject	Instructions		Examination			Duration
	Hours/Week	Hours/Semester	Marks			
			Internal assessment	Board Examination	Total	
ENGINEERING CHEMISTRY-II	4 Hours	64 Hours	25	75	100	3 Hours

**Topics and Allocation of Hours:**

Unit No	Topics	Time Hours
Unit-I	Environmental Chemistry	11 Hours
Unit-II	Fuels, Rocket propellants and combustion	12 Hours
Unit-III	Extraction of metals, Powder Metallurgy, Alloys and Abrasives	11 Hours
Unit-IV	Composite materials, Ceramics, Refractories and Lubricants	11 Hours
Unit-V	Polymer and Rubber	11 Hours
	Revision and Examination	8 Hours
<b>Total</b>		<b>64 Hours</b>

**Rationale:**

Modern development of industries require more understanding of materials required for Engineering and industrial purposes. This part of chemistry explains various aspects with regard to environment, fuels, metals and alloys, and polymers. This subject will develop basic understanding and skill of Engineering Students.

**Objectives:**

**The objective of this Course is to make the student:**

1. To acquire knowledge about Environmental chemistry.
2. To acquire knowledge about fuels, advantages and combustion of fuels and analysis.
3. To know about metal extraction, powder metallurgy, alloys, and Abrasives.
4. To acquire knowledge about composite Materials, Ceramics, Refractories and Lubricants.
5. To know about polymers and Rubber.

## Learning Structure

### Application

Apply the knowledge in controlling environmental pollution and selecting fuels, propellants, metals and alloys used in Engineering and polymeric materials used in domestic, industrial and medical fields. To select material where requirements are very stringent and specific.

### Procedure

Explaining Pollution, pollutants and Managing pollution.	Defining fuels types, Propellants, combustion and calculation of volume of air required for combustion.	Explaining the extraction of titanium and Tungsten, composition and uses of alloys, applications of powder metallurgy and essentiality of Abrasives.	Explaining applications of composite materials and manufacture of Ceramic materials. Essentiality of Refractories and Lubricants.	Defining polymerization and study of plastics and Rubber
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### Concepts

Understanding Environmental Pollution and methods to control.	Knowledge of various types of fuels calorific value and propellants and combustion of fuels.	Understanding Extraction of metals, powder metallurgy, properties of alloys and uses of abrasives.	Understanding Characteristics of Composite materials. Manufacture of ceramic materials. Refractories and Lubricants.	Understanding of organic reactions like polymerization and producing polymers like plastics and Rubber.
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### Facts

Study of Pollutants and their Problems.	Fuels Different Types, Quality of propellants and Combustion qualities.	Study of extraction of metals, Powder metallurgy, Alloys and Abrasives.	Knowledge of composite materials. Ceramics, Refractories & lubricants as important Engineering Materials and their uses.	Plastics types and uses, Rubber types and uses.
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**DETAILED SYLLABUS**  
**CONTENT**

Unit No.	Name of the Topic	Hours	Marks
<b>I</b>	<p><b>ENVIRONMENTAL CHEMISTRY:</b></p> <p><b>1.1. Air Pollution - 4 Hours</b> Definition- Pollutants (SO<sub>2</sub>, H<sub>2</sub>S, HF, CO, Dust) -harmful effects -Acid rain – formation - Harmful effects-Green House effect- causes- Global Warming - Harmful effects - Ozone layer- importance - causes for depletion of Ozone layer (No equations)- effects of Ozone layer depletion -Control of air Pollution.</p> <p><b>1.2. Water Pollution - 4 Hours</b> Causes – (Sewage, effluents, algae microorganisms)- Harmful effects, sewerage - Industrial effluents- harmful effects of heavy metal ions (metals like Lead, Cadmium, Zinc and Copper) – treatment – Eutrophication - Definition and effects – Carcinogenic wastes, pesticides, Insecticides - Health problems.</p> <p><b>1.3. Solid Waste management - 2 Hours</b> solid wastes-definition-problems-types of wastes- methods of disposal (land fill-incineration) - recycling –advantages of recycling (Basic ideas).</p> <p><b>1.4. Green Chemistry - 1 Hour</b> Definition- Goals of green Chemistry (Basic ideas).</p>	<b>11</b>	<b>15</b>
<b>II</b>	<p><b>FUELS, ROCKET PROPELLANTS AND COMBUSTION:</b></p> <p><b>2.1. Fuels: - 6 Hours</b> Definition-Calorific value- classification, solid fuels-wood-coal - varieties of coal-composition-specific uses-liquid fuels-petroleum-fractional distillation -Fractions and uses, Cracking (concept only). Liquid Hydrogen as fuel- gaseous fuels-preparation and specific uses of producer gas, water gas, biogas-LPG- composition and uses. Advantages of gaseous fuels.</p> <p><b>2.2. Rocket propellants: - 2 Hours</b> Definition- Essential characteristics- classifications of propellants-brief account of solid &amp; liquid propellants with example.</p> <p><b>2.3. Combustion: - 4 Hours</b> Combustion of fuels- Definition- combustion calculation by mass (for solid and liquid fuels)- combustion calculation of gaseous fuels- stoichiometric calculations-Volume of air required-excess air- Flue gas- Flue gas analysis- Orsat Apparatus-simple numerical problems.</p>	<b>12</b>	<b>15</b>

Unit No.	Name of the Topic	Hours	Marks
III	<p><b>EXTRACTION OF METALS, POWDER METALLURGY, ALLOYS AND ABRASIVES</b></p> <p><b>3.1. Extraction of metals - 2 Hours</b> Extraction of Tungsten and Titanium-uses.</p> <p><b>3.2. Powder Metallurgy - 2 Hours</b> Definition – Metal Powder- Preparation of Metal Powder- Atomisation- Reduction of Metal Oxide- Applications of Powder Metallurgy.</p> <p><b>3.3 Alloys – 4 Hours</b> Definition- purpose of Alloying- <b>Non- Ferrous alloys</b> - Definition- Composition and uses of – Nickel alloys- Nichrome, Locanel - Copper alloys- Brass - Dutch metal, Cartridge brass, German silver- Bronze- coinage bronze, Gun metal. Aluminium alloys- Duralumin, Magnalumin.</p> <p><b>3.4. Abrasives -3 Hours</b> Definition -classification-hardness in moh’s scale - Natural abrasives-Diamond, Corundum, Emery, and Garnet. - Synthetic abrasives-Carborundum – Boron carbide manufacture-Properties and uses.</p>	11	15
IV	<p><b>COMPOSITE MATERIALS, CERAMICS, REFRACTORIES AND LUBRICANTS</b></p> <p><b>4.1. Composite Materials – 3 Hours</b> Definition-advantages over metals and polymers-general applications – types - fibre reinforced composites- particulate composites-layered composites.(basic ideas and specific applications)</p> <p><b>4.2. Ceramics – 3 Hours</b> White pottery- Definition-manufacture of White pottery-uses-glazing -definition -purpose-method-salt glazing.</p> <p><b>4.3. Refractory – 3 Hours</b> Definition-requirements-classification with examples and uses of fireclay bricks, Alumina bricks and silica bricks.</p> <p><b>4.4. Lubricants -2 Hours</b> Definition- Characteristics of Lubricants- Types of Lubricants: Solid, Semisolid and liquid Lubricants.</p>	11	15

Unit No.	Name of the Topic	Hours	Marks
V	<p><b>POLYMERS AND RUBBER :</b></p> <p><b>5.1 Polymers:</b></p> <p><b>Plastics - 6 Hours</b></p> <p>Polymerization-types of polymerization-Addition polymerization-formation of polythene-condensation polymerization-formation of phenol formaldehyde-types of plastics-thermoplastics &amp; thermo set plastics-Differences-Mechanical properties-Advantages over traditional materials, (wood &amp; metal)-specific uses of Bakelite, PVC, Nylon &amp; urea formaldehyde resin-reinforced or filled plastics-definitions- advantages-applications-polymers in surgery-biomaterial-definition-Biomedical uses of polyurethane, PVC, polypropylene, polyethylene.</p> <p><b>5.2 Rubber -5 Hours</b></p> <p>Natural rubber-preparation from latex –defects of natural rubber compounding-ingredients &amp; their functions-vulcanization-purpose-synthetic rubber-Buna-S. Thiokol, Neoprene (Preparation &amp; specific uses only-no equation) reclaimed rubber-definition-process-properties-uses.</p>	11	15

**Text Books:**

1. Engineering Chemistry-Jain& Jain Dhanpat Rai&Sons - 2005
2. A Textbook of Engineering Chemistry S.S.Dara. S.Chand& Company Ltd. - 1996

**Reference Books :**

1. Engineering Chemistry-Uppal Khanna publishers. - 1986
2. Chemistry of Engineering Materials C.V. Agarwal, C. Parameswara Moorthy, Andra naidu B.S. Publications. - 2006
3. A Textbook of Inorganic Chemistry –P.L. Soni, S.Chand & Company Limited. - 1997
4. Rain Water Harvesting –handbook Chennai metro water.

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**ENGINEERING CHEMISTRY - II**  
**MODEL QUESTION PAPER -1**

Time: 3 Hrs

Total marks: 75

**PART-A**

**I. Answer any Fifteen Questions:**

15x1=15 marks

**All Questions carry equal marks**

1. Define Pollution.
2. What is Sewage?
3. Give two examples of greenhouse gases.
4. Give two Harmful effects of Lead pollution.
5. Give two uses of silica bricks.
6. What are the components present in LPG gas?
7. What is flue gas?
8. What are Propellants?
9. What is producer gas?
10. Mention the ore of Tungsten.
11. Mention the methods of metallic powder.
12. What are alloys?
13. What are abrasives?
14. What is called Bisque?
15. What are refractories?
16. What are the types of composite materials?
17. Give two examples of solid lubricants.
18. What are the types of polymers?
19. Mention any two uses of PVC.
20. What is Vulcanization?

**PART- B**

**II. Answer any TWO Sub-divisions in each of the following Questions: 5x12=60**

**All Questions carry equal marks**

1. a) What is global warming? List its harmful effects.  
b) Define Green Chemistry. Give the goals of green Chemistry.  
c) Explain how solid wastes are recycled for use.
2. a) Explain fractional distillation of petroleum?  
b) How is water gas manufactured?  
c) A fuel contains 40% H<sub>2</sub> 45% CO 11% CH<sub>4</sub> and 4% O<sub>2</sub> by volume Determine the volume of air required to burn 1m<sup>3</sup> of the fuel?
3. a) Describe the extraction of Titanium from its ore?  
b) List the advantages of alloying a metal.  
c) Write a note on Natural Abrasives.
4. a) What are the advantages of composite materials over traditional materials?  
b) Describe the manufacture of white pottery?  
c) What are the characteristics of good refractories.
5. a) Distinguish between Addition and condensation polymerization?  
b) What are the Mechanical properties of plastics?  
c) Write notes on synthetic Rubber.

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**ENGINEERING CHEMISTRY - II**  
**MODEL QUESTION PAPER -2**

Time: 3 hours

Maximum Marks: 75

**Part – A**

**I. Answer any 15 questions**

(15 x 1 =15)

**All questions carry equal marks**

1. Define air pollution.
2. Mention the name of a pollutant responsible for depleting ozone layer.
3. What is called effluent?
4. Give any two goals of green chemistry.
5. Define Calorific value of a fuel.
6. What is meant by cracking?
7. Give two examples of liquid propellants.
8. Give the composition of water gas.
9. Mention the ores of Titanium.
10. Give the composition of German silver.
11. Define powder metallurgy.
12. Give two examples for synthetic abrasives.
13. Mention two uses of alumina bricks.
14. Give two examples for fibre reinforced composites.
15. Define white pottery.
16. Give two examples for Liquid Lubricants.
17. Define Addition polymerization.
18. What are reinforced plastics?
19. Mention the uses of Thiokol rubber.
20. What is reclaimed rubber?

**Part – B**

**II. Answer any two subdivisions in each of the following questions:(5 x 12=60)**

**All Questions carry Equal marks**

1. a) What are the main air pollutants? Mention their harmful effects.  
b) Define Eutrophication. What are its harmful effects?  
c) Write the advantages of recycling of solid wastes.
2. a) Write a note on solid fuels.  
b) Give a brief account on Solid Propellants.  
c) A producer gas has the following composition by volume:  
CH<sub>4</sub>=3.5%; CO = 25%; H<sub>2</sub>= 10%; CO<sub>2</sub>=10.8%; N<sub>2</sub> = 50.7%.  
Calculate the theoretical quantity of air required for combustion per m<sup>3</sup> of the gas.
3. a) Describe the extraction of Tungsten from its ore. Mention any of its two uses.  
b) What are Alloys? How are they classified? Give Examples.  
c) Explain how Carborundum and Boron Carbide are manufactured. Mention their uses.
4. a) Write a note on particulate composites and layered composites.  
b) Define and explain glazing.  
c) Explain classification of lubricants with examples.
5. a) What are the advantages of plastics over traditional materials?  
b) What are the ingredients added during compounding of rubber? Give their functions.  
c) Write a note on Reclaimed rubber.

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**ENGINEERING CHEMISTRY – II PRACTICAL**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **22008**

Semester : II Semester

Subject Title : **ENGINEERING CHEMISTRY – II PRACTICAL**

**SCHEME OF INSTRUCTIONS AND EXAMINATION:**

**No. of Weeks per Semester: 16 Weeks**

Subject	Instructions		Examination			
	Hours/Week	Hours/Semester	Internal assessment/Record	Board Examination	Total	Duration
ENGINEERING CHEMISTRY- II PRACTICAL	2	32	25	75	100	3 Hours

**OBJECTIVES:**

- At the end of the program the Student will be able to identify the Acid and basic radicals present in the given Inorganic simple salt.
- To analyse the given effluent and to find out the presence of heavy metal ion present in it.
- To study about the harmful effect of the effluent.
- 

**I. INTERNAL ASSESSMENT/ RECORD: 25 MARKS**  
**II. BOARD EXAMINATION EVALUATION: 75 MARKS**

1.	Analysis of Inorganic simple salt.	50 Marks
2.	Analysis of Effluent	20 Marks
3.	Viva –Voce	5 Marks
Total		75 Marks

**ENGINEERING CHEMISTRY-II PRACTICAL**  
**CONTENTS**

**Intellectual Skills:**

- Study the effect of heating on materials and reagents.
- Study of the reactions of the following radicals leading to qualitative analysis of the given Inorganic simple salt soluble in water or dilute acids.

**Acid radicals:** Chloride, Carbonate, Sulphate and Nitrate.

**Basic radicals:** Lead, Copper, Aluminium, Zinc, Barium, Calcium, Magnesium and Ammonium.

### Motor Skills:

1. Handling the apparatus Care fully.
2. Industrial safety.

### I. Analysis Of Inorganic Simple Salt:

The Students may be asked to analyse eight inorganic simple salts containing any of the acid and basic radicals in each salt without omitting any of the above mentioned radicals and write the analysis in record book mentioning the name of the salt.

### II. Analysis of effluents containing the following metal ions - Lead, Copper, Cadmium and Zinc.

Students may be given above four pollutants, in four separate test tubes in solution form and asked to report metallic pollutants with procedure (Basic Radical Analysis Procedure) and their harmful effects.

**Note:** All the students are given same Questions and each student is given one Inorganic simple salt and one effluents containing one basic radical.

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### MODEL QUESTION PAPER

1. Analyse the given Inorganic Simple Salt and report the acid radical and basic radical present in it. Record your observations. Name the chemical substance
2. Analyse the given sample of effluent and report the metallic pollutant with procedure and its harmful effects.

**Note:** All the students are given same Questions and each student is given different Inorganic simple salt and different effluents.

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### SCHEME OF VALUATION

#### I. QUALITATIVE ANALYSIS:- ( 50 marks)

- |  |              |
|--|--------------|
| 1. Identification of Acid radical with systematic procedure  | - 23 Marks   |
| 2. Identification of Basic radical with systematic procedure | - 23 Marks   |
| 3. Name of the Simple Salt                                   | - 4 Marks    |
| (Mere Spotting of radicals without complete procedure)       | - 3+3 Marks) |

#### II. EFFLUENT ANALYSIS:- (20 marks)

- |   |            |
|---|------------|
| 1. Identification of Metallic pollutant with systematic procedure | - 15 Marks |
| 2. Harmful effects  | - 5 Marks  |
| (Mere Spotting Pollutant)   | - 3 Marks) |

**Viva-Voce**  
**Total**

**- 5 Marks**  
**- 75 Marks**

### Reference Books:

1. Vogel- Analytical chemistry- Pearson publication.
2. Dr. Sudharani- Laboratory manual on engineering of chemistry

## FIRST YEAR ENGINEERING CHEMISTRY LABORATORY

### LIST OF EQUIPMENT

List of equipments needed for a batch of 30 students in Chemistry Laboratory

#### **Non-Consumable Items:**

10. Indane gas Connection (DBC)	1 no
11. Exhaust Fan (High capacity)	Sufficient Numbers
12. Fire Extinguisher	1 no
13. First Aid Box (Full set)	2 nos
14. Safety chart	1 no
15. Chemical Balance	1 no
16. Fractional weight box	1 no
17. PH meters	5 nos
18. Working Table with all accessories	8 nos

#### **Glassware and Other Items:**

30. Burette 50ml	35 nos
31. Pipette 20ml (with safety bulb)	35 nos
32. Conical Flask 250ml	35 nos
33. Funnel 3" (Polythene)	50 nos
34. Porcelain Tile 6x6"	35 nos
35. Measuring Cylinder	
a. 100ml	5 nos
b. 500 ml	3 nos
36. Reagent Bottle (White) 250ml	60nos
37. Reagent Bottle (White) 125ml	100 nos
38. Reagent Bottle (Amber) 250ml	80 nos
39. Test tubes	
a. 15 x 1.5mm	1000 nos
b. 15 x 2.5mm	500 nos
40. Test tube stand	35 nos
41. Test tube holder	35 nos
42. Test tube cleaning brush	35 nos
43. Glass Trough	5 nos
44. Beakers	
e. 1000 ml	5 nos
f. 500 ml	5 nos
g. 250 ml	35 nos
h. 100 ml	5nos
45. Glass Rods 15cm	100 nos
46. Watch Glass 3"	35 nos

47. Wash Bottle (Polythene) 1000ml	35 nos
48. Nickel Spatula	10 nos
49. Kipps Apparatus	1 no
50. Burner Nipple	30 nos
51. Bunsen Burner for gas connection	30 nos
52. Wire Gauge with asbestos center	15 nos
53. Plastic Buckets (15 lts)	10 nos
54. Tripod Stand (Iron)	30 nos
55. Filter Paper Round sheets	1000 nos
56. Burette stand	35 nos
57. Standard flask 100 ml	35 nos
58. Pipette 10ml	5 nos.

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**List of Apparatus to be supplied for each student in Chemistry lab during SECOND Semester  
Practical Class/Board Examination** **in addition to required**

**Reagents.**

1. Test tubes	
a. 15 x 1.5mm	- 4
b. 15 x 2.5mm	- 2
2. Test tube stand	- 1
3. Test tube Holder	- 1
4. Test tube cleaning brush	- 1
5. Funnel	- 1
6. Glass Rod	- 1
7. Spatula	- 1
8. Watch Glass	- 1
9. Beakers 250 ml	- 1
10. Wash Bottle	- 1

--xXx--



**ENGINEERING GRAPHICS - II**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV  
 Subject Code : **22006**  
 Semester : II Semester  
 Subject Title : **ENGINEERING GRAPHICS – II**

**Objective**

At the end of the practice the students will be able,  
 To state the importance of drawing.  
 To draw the development of surfaces.  
 To draw projection of solids.  
 To draw sectional views of solids and true shape.  
 To convert orthographic views into isometric drawing.

**SCHEME OF INSTRUCTION AND EXAMINATION**

**No. of Weeks per Semester: 16 Weeks**

Subject	Instruction		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
ENGINEERING GRAPHICS - II	6	96	Internal	Examination	Total	3 Hrs.
			25	75	100	

**TOPICS AND ALLOCATION**

Sl.No.	Topics	Hours.
1	Development of surfaces	18 Hrs.
2	Projection of solids	18 Hrs.
3	Section of Solids	18 Hrs.
4	Isometric projections	33 Hrs.
	Test	9 Hrs.

**DETAILED SYLLABUS**

**Unit-1**

**18 Hrs.**

**1.1 Development of surfaces**

- 1.1.1 Need for preparing development drawing with reference to sheet metal work - Development of cube, cylinder, prism and pyramids, frustum of pyramids and cones – Exercises in triangular, square, pentagon and hexagon prisms and pyramids, cylinder and cone.  
 1.1.2 Development of T-pipe, elbow, ducts, tray, lamp shade and funnel.

**Unit-2**

**18 Hrs.**

**2.1 Projection of solids**

- 2.1.1 Introduction - important terms - classification of solids – triangular and hexagonal prisms and pyramids - solids of revolution – cylinder and cone.  
 2.1.2 Projections of solids in simple positions – parallel to one plane and perpendicular to other plane - projections of solids with axis inclined to HP and parallel to VP - projections of solids

with axis inclined to VP and parallel to HP - Projections of solids with axis parallel to both planes - exercises.

### **Unit - 3**

**18 Hrs.**

#### **3.1 Section of Solids**

- 3.1.1 Introduction - section planes - apparent section - true section - sectional view - need for sectional view - cutting plane - cutting plane line.
- 3.1.2 Section plane perpendicular to VP and parallel to HP - section plane perpendicular to HP and parallel to VP - section plane perpendicular to VP and inclined to HP - section plane perpendicular to HP and inclined to VP – Section of solids in simple positions – parallel to one plane and perpendicular to other plane - axis parallel to both planes showing true shape of section – exercises.

### **Unit - 4**

**33 Hrs.**

#### **4.1 Isometric projections**

- 4.1.1 Introduction – isometric view - isometric projection – difference between isometric view and isometric projection - isometric scale - methods of drawing an isometric view- box method.
- 4.1.2 Angles in Isometric view - irregular curves in isometric drawing - circles in isometric method – four centre method for drawing an ellipse - arcs of circles in isometric – Draw the isometric view of the object from the given orthographic view - exercises.

**TEST**

**9 Hrs.**

#### **Text Books**

1. Gill P.S., “Engineering drawing”, S.K.Kataria & Sons.
2. Bhat N.D., “Engineering drawing”, Charotar Publishing House.

#### **Reference Books**

1. Gopalakrishnan.K.R., "Engineering Drawing", (Vol.I and Vol.II), Dhanalakshmi publishers, Edition 2, 1970
2. Venugopal.K, Sreekanjana G, “Engineering Graphics” New Age International Publishers.
3. K V Nataraajan “A Text Book of Engineering Drawing”
4. Thomas E.French, Charles J.Vierck, Robert J.Foster, “Engineering drawing and graphic technology”, McGraw Hill International Editions.
5. Barkinson & Sinha, "First Year Engineering Drawing", Pitman Publishers.
6. Shah/Rana, “Engineering Drawing”, Pearson Longman.

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**ENGINEERING GRAPHICS – II**  
**II Semester**

**Learning Structure:**

**Problem**

To acquire the skill of visualizing, interpreting and drawing the development of solids and components - projection of solids – section of solids and isometric views.



**Procedure**

Read, understand, visualize, interpret and draw development of surfaces - projection of solids – section of solids and isometric views



**Principles**

Development of surfaces - Projection of solids – sectional views - Isometric projection.



**Concept**

Reference planes (HP,VP) - locus of points - convention of lines - polygon as per IS Code.



**Facts**

Various objects, geometric entities, line, arc, circles, drawing instruments

**Board Examination – QUESTION PATTERN**

**Time: 3 Hrs.**

**Max.Marks: 75**

**Part A** (Answer any three questions. Each question carries FIFTEEN marks.)      3 X 15 = 45

1. One question from development of surfaces.
2. Two questions from projection of solids.
3. One question from section of solids.

**Part B**

**30 marks**

4. Draw isometric view of the component (The object must have inclined and curved parts).

**Internal Marks**

**25 marks**

Class work - submission of drawing file	-	10 marks
Test (including model examination)	-	10 marks
Attendance	-	5 marks
<b>Total</b>	-	<b>25 marks</b>

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**ENGINEERING GRAPHICS - II  
MODEL QUESTION PAPER - 1**

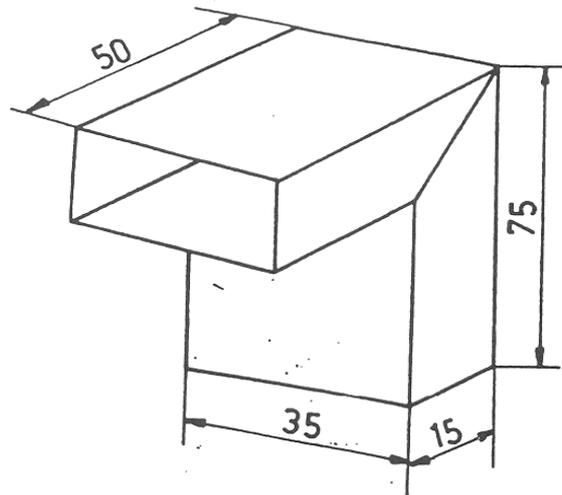
**Time : 3Hours**

**Max. Marks : 75**

*[N.B. (1) First angle projection is to be followed. (2) All the questions are to be answered in drawing sheet supplied. (3) All dimensions are in mm. (4) Credit will be given for neatness.]*

**PART-A** (Answer any three questions. Each question carries fifteen marks.)      3 X 15 = 45

1. Draw the development of Duct shown in Fig. 1.



**Fig. 1**

2. Draw the projection of a pentagonal prism of base side 20 mm, axis 35 mm when it is resting on the HP on its base with one of the edges of the base inclined at  $30^\circ$  to the VP.

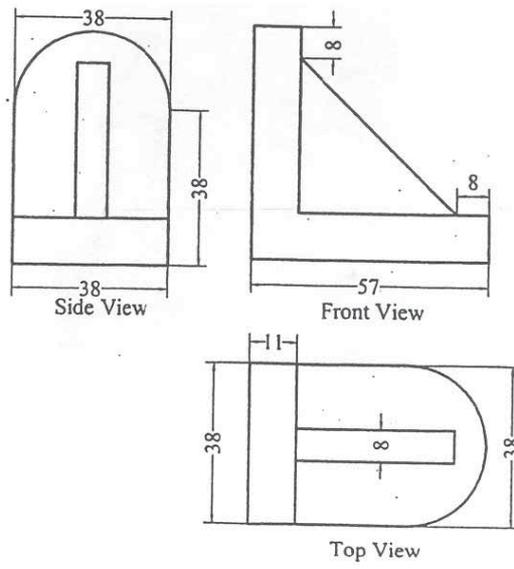
3. A cone of base diameter 60 mm and altitude 80 mm rests on the HP with its axis inclined to the HP and parallel to the VP. Draw its front and top views.

4. A hexagonal prism of base side 40 mm and axis length 80 mm is lying on the HP on one of its rectangular faces with its axis inclined at  $60^\circ$  to the VP. It is cut by a plane which makes  $45^\circ$  with the xy. The cutting plane nearest to the HP is 14 mm above it. Draw the front view, sectional top view and the true shape of the section.

**PART-B**

**30 marks**

5. Draw the isometric view of the object shown in Fig. 2.



**Fig. 2**

**ENGINEERING GRAPHICS - II  
MODEL QUESTION PAPER - 2**

**Time : 3Hours**

**Max. Marks : 75**

[N.B. (1) First angle projection is to be followed. (2) All the questions are to be answered in drawing sheet supplied. (3) All dimensions are in mm. (4) Credit will be given for neatness.]

**PART-A** (Answer any three questions. Each question carries fifteen marks.) 3 X 15 = 45

1. A triangular pyramid of side of base 30 mm and height 60 mm is resting on its base on HP such that a triangular face is parallel to VP. It is cut by a plane perpendicular to VP, inclined at  $30^\circ$  to HP and passing through a point on the axis 25 mm from the base. Develop the lateral surface of the truncated triangular pyramid.

2. Draw the projection of a cone of base diameter 50 mm and axis length 70 mm when it lies on the ground on one of its generators with the axis parallel to the VP.

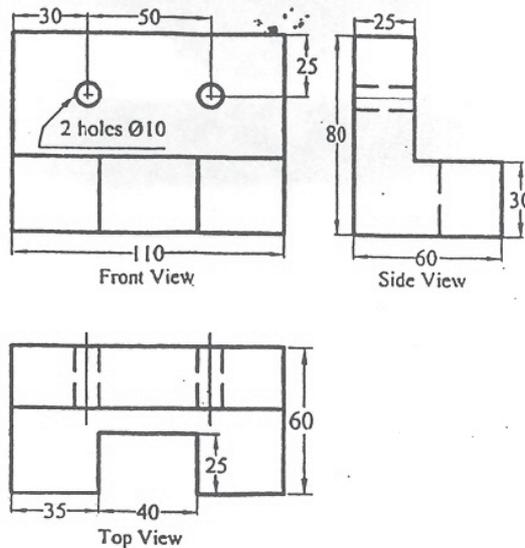
3. A triangular pyramid of base edge 40 mm and altitude 60 mm is resting on the HP on one of its base edges with its axis parallel to both the HP and VP. Draw its front and top view.

4. A cylinder of diameter 40 mm and height 60 mm rests on its base on the HP. It is cut by a plane perpendicular to the VP and inclined at  $30^\circ$  to the HP. The plane bisects the axis. Draw the front view, sectional top view and true shape of the section.

**PART-B**

**30 marks**

5. Draw the isometric view of the object shown in Fig. 1.



**Fig. 1**



**WORKSHOP PRACTICE**



**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**  
**DIPLOMA IN ENGINEERING - SYLLABUS**  
**L- SCHEME**

(Implements from the Academic Year 2011-2012 onwards)

Course Name: All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV.

Subject Code : **22009**

Semester : II Semester

Subject Title : **WORKSHOP PRACTICE**

**Objectives**

- At the end of the practice, the students will be able,
- To acquire skills in basic engineering practice.
- To identify the hand tools and instruments.
- To acquire measuring skills.
- To acquire practical skills in the trades.

**SCHEME OF INSTRUCTION AND EXAMINATION**

**No. of Weeks per Semester: 16 Weeks**

Subject	Instruction		Examination			Duration
	Hours / Week	Hours / Semester	Marks			
WORKSHOP PRACTICE	3	48	Internal	Examination	Total	3 Hrs.
			25	75	100	

**Note:**

The students should be given training in both sections. All the exercises should be completed. The students should maintain record notebook for the concerned trades and submit during the Board Practical Examinations. **Wiring exercises should be done in the workshop section itself, not in the Electrical laboratory.**

**FITTING SECTION**

- General safety precaution inside the workshop.
- Study about first aid.
- Study of hand tools and measuring instruments.
- Marking and punching practice.
- Hacksaw cutting practice.
- Filing and fitting practice.
- Drilling and tapping practice.

**Note:** Practices should be given to cover the above area. At the end, the students should be able to do the following exercises for the board practical examinations. Students should mention the variations in the dimensions of their exercises.

**Exercises**

1. V-Joint
2. L-Joint
3. Step joint
4. U-Joint

5. Drilling and tapping 1
6. Drilling and tapping 2

**Note:** 70mm X 50 mm X 3mm thick plate can be used for the above joints. All the exercises should be given for the board practical examinations.

**Drilling and Tapping operations should be exercised in the Fitting section itself.**

### **WIRING**

- Study about the safety in wiring.
- Study of tools.
- Study about the earthing.
- Identify different electrical fitting and accessories.
- Identify the types of wires with colour code.
- Identify the symbols in circuit diagram.
- Practice simple wiring.
- Practice soldering.

### **Exercises**

1. One lamp controlled by one-way switch.
2. Two lamps controlled by one-way switch in series.
3. Two lamps controlled by one-way switch in parallel.
4. Staircase wiring.
5. Tube light connection.
6. Circuit diagram for a fan.

**Note:** Wiring section should be attached with the Fitting section.

**Required wiring components should be given to the students along with the board. Students should draw the circuit diagram and fix the components according to their circuit. The power connection must be given on the board and the circuit must be tested with power after taking the due precaution. The concern faculty/examiner must ensure that the proper precaution has been taken before providing the power to the circuit. All the components should be disassembled from the board after evaluation by the examiner.**

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**BOARD EXAMINATION EVALUATION**  
**Practical Examination**

**Note:** Arrangement should be made to conduct the examinations inside the workshop for both the sections.

All the exercises should be given in the question paper and students are allowed to select by a lot.

<b>Exercises</b>	<b>Duration</b>	<b>Max. Marks</b>
<b>Fitting</b>	<b>1 ½ Hrs</b>	<b>35</b>
<u>Allocation</u>		
<i>Marking &amp; Cutting</i>		10
<i>Dimensions</i>		20
<i>Joint / Finish</i>		5
<b>Wiring</b>	<b>1 ½ Hrs</b>	<b>35</b>
<u>Allocation</u>		
<i>Circuit diagram</i>		10
<i>Assembly &amp; connection</i>		20
<i>Result</i>		5
<b>Viva-voce</b>		<b>5</b>
<b>Internal Assessment</b>		<b>25</b>
<b>TOTAL</b>		<b>100</b>

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### LIST OF TOOLS & EQUIPMENT REQUIRED

**NAME OF THE BRANCH / COURSE** : FIRST YEAR ENGINEERING/TECHNOLOGY  
**SEMESTER** : II SEMESTER  
**NAME OF THE LABORATORY** : WORKSHOP PRACTICE – FITTING SECTION

<b>S.No</b>	<b>LIST OF THE TOOLS &amp;EQUIPMENTS</b>	<b>QUANTITY REQUIRED</b>
1	4" Bench vice	30 No's
2	12" Flat Rough file	30 No's
3	12" Flat smooth file	30 No's
4	10" Try angular file	30 No's
5	8" Half round file	30 No's
6	8" Square file	30 No's
7	10" Round file	30 No's
8	150 mm Try square	30 No's
9	150 mm Steel rule	30 No's
10	6 mm Dot punch	30 No's
11	6 mm Center punch	30 No's
12	Hacksaw Frame	30 No's
13	6" leg vice	5 No's
14	6 mm Prick punch	5 No's
15	Hand shearing machine	1 No
16	Ball Pan ½ lbs Hammer	30 No's
17	6.8 mm Drill Bit	5 No's
18	8.5 mm Drill Bit	5 No's
19	10.2 mm Drill Bit	5 No's
20	M8 tap set	5 No's
21	M10 tap set	5 No's
22	M12 tap set	5 No's
23	Bench drilling machine	5 No's
24	Deep cut Hacksaw frame	5 No's
25	2' x 1 ½' Surface plate	2 No's
26	Scriber	30 No's
27	Tap wrench	10 No's

**NAME OF THE BRANCH / COURSE** : FIRST YEAR BASIC ENGINEERING  
**SEMESTER** : II SEMESTER  
**NAME OF THE LABORATORY** : WORKSHOP PRACTICE – WIRING SECTION

<b>S.No</b>	<b>LIST OF THE TOOLS &amp;EQUIPMENTS</b>	<b>QUANTITY REQUIRED</b>
1	6" Insulated handle cutting pliers	30 No's
2	8" Insulated handle screw driver	30 No's
3	¼ Pound hammer	30 No's
4	Wire Cutter	30 No's
5	250V Line Tester	30 No's
6	10 cm Poker	30 No's
7	4" Connecting Screw driver	30 No's
8	2x1½ Wiring board	30 No's
9	Multi meter	5 No's
10	Required numbers of switches and sufficient consumables	

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