

[B17 BS 1101]

**I B. Tech I Semester (R 17) Regular Examinations**

**ENGLISH-I**

(Common to all branches)  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. A) Correct the following sentences. (7M)
- The machineries were expensive.
  - Suppose, if you arrive late, you will miss the show.
  - Choose the best of the two options.
  - I enjoyed during the holidays.
  - I have seen him yesterday.
  - The teacher gave us many advices.
  - My dog is better than him.
- B) a) Write appropriate quantifiers for each sentence. (3M)
- The project is ..... complicated than the last one
  - I have to buy .....pairs of blue and black jeans soon.
  - There is no ..... water in the bottle.
- b) Re-write the sentences by using Gerunds, to-infinitives or plain infinitive forms. (4M)
- I noticed him ..... (write) picture postcards.
  - I feel happy to be..... (sing) a song.
  - They felt surprised to ..... (select) by the manager.
  - .....(Garden) is a pleasant activity.
- (OR)
2. A) Fill in the blanks using the appropriate forms of verbs given in the brackets. (7M)
- In a fit of rage, she \_\_\_\_ up the letter. (Tear)
  - We couldn't have \_\_\_\_ a better day for organizing the party. (Choose)
  - It's high time you \_\_\_\_ your mistake. (Realise)
  - The poem 'The Gift of India' \_\_\_\_ (write) by Sarojini Naidu in 1915.
  - We \_\_\_\_ for five years now. (marry)
  - When I \_\_\_\_ home, I found that there was no edible oil left. (go)
  - The Journalist reported that the miscreants \_\_\_\_ a havoc in the city. (create)
- B) a) Fill in the blanks by using appropriate conjunctions (3M)
- Receptionists must be able to relay information \_\_\_\_ pass messages accurately.
  - Mary is a member of the Historical Society \_\_\_\_ the Literary Society.
  - My friend didn't work hard \_\_\_\_ he got through the exam.
- b) Punctuate the following sentences. (4M)
- sunil sharma is documentation development manager at cerner corporation one of the world's largest medical software developers
  - As part of his job Sunil writes web-based content for Cerner.
  - Hang him not leave him.
  - my friend suresh who is in bengaluru has come today.

## UNIT-II

3. A) Write one word substitutions to the following and write sentences by using them. Marks will be awarded only when both the points are correctly answered. (7M)
- Language which is confusing and unintelligible.
  - One who prepares plans for buildings.
  - A great lover of books
  - A person in charge of a museum
  - A man who thinks only for himself
  - One who kills animals and sells their flesh
  - A person with a long experience in a specific field
- B) a) Give synonyms for the following words and use them in your own sentences. (3M)
- Euphoria
  - Vicious
  - Ostentatious
- b) Give antonyms for the following words and use them in your own sentences. (4M)
- Truce
  - Terse
  - Supercilious
  - Emerge

### (OR)

4. A) Give meanings for the following idioms and also use them in your own sentences. (7M)
- The cream of the crop
  - An arm and a leg
  - Hand in glove
  - Hue and cry
  - Hard and fast
  - Explore all avenues
  - Spill the beans
- B) a) Give synonyms for the following words and use them in your own sentences. (3M)
- Sacrilege
  - Pugnacious
  - Vitiate
- b) Give antonyms for the following words and use them in your own sentences. (4M)
- Succinct
  - stigmatize
  - recalcitrant
  - Adamant

## UNIT-III

5. A) Read the following paragraph and answer the questions: (7M)

The study of history provides many benefits. First, we learn from the past. We may repeat mistakes, but, at least, we have the opportunity to avoid them. Second, history teaches us what questions to ask about the present. Contrary to some people's view, the study of history is not the memorization of names, dates, and places. It is the thoughtful examination of the forces that have shaped the courses of human life. We can examine events from the past and then draw inferences about current events. History teaches us about likely outcomes.

Another benefit of the study of history is the broad range of human experience which is covered. War and peace are certainly covered as are national and international affairs. However, matters of culture (art, literature, and music) are also included in historical study. Human nature is an important part of history: emotions like passion, greed, and insecurity have influenced the shaping of world affairs. Anyone who thinks that the study of history is boring has not really studied history.

- What is the central idea of this passage?
  - In the first paragraph, 'inferences' mean?
  - Which method of teaching history would the author of this passage support?
  - In the second paragraph, 'shaping of world affairs' Means.
  - What is the conclusive thought of the author?
  - Give an appropriate title for the written discourse.
  - How reliable is the written history; and/or is it just 'his' story?
- B) Develop a paragraph (200 words) based on the following hints and provide an appropriate title for the same. (7M)

As the 11th President of India--- the Indian National Congress-----  
'people's president', he was----- His contribution -----Bharat Ratna. During  
-----in India. He is the -----India: 2020 and Ignited Minds.

**(OR)**

6. A) Read the following paragraph and answer the questions: (7M)

Work expands so as to fill the time available for its completion. The general recognition of this fact is shown in the proverbial phrase, 'It is the busiest man who has time to spare.' Thus, an elderly lady at leisure can spend the entire day writing a postcard to her niece. An hour will be spent in finding the postcard, hunting for spectacles, half an hour to search for the address, an hour and a quarter in composition and twenty minutes in deciding whether or not take an umbrella when going to the pillar box in the street. The total effort that would occupy a busy man for three minutes, all told, may in this fashion leave another person completely exhausted after a day of doubt, anxiety and toil.

1. What happens when the time to be spent on some work increases?
2. Explain the sentence: 'Work expands so as to fill the time available for its completion.'
3. Who is the person likely to take more time to do work?
4. What is the total time spent by the elderly lady in writing a postcard?
5. What does the expression 'pillar box' stand for?
6. Suggest an appropriate title for the passage.
7. 'It is the busiest man who has time to spare' Elaborate the semantic content of it.

B) Develop a paragraph (200words) based on the following hints and provide an appropriate title for the same. (7M)

\_\_\_\_\_not luck but labor \_\_\_\_\_ Luck \_\_\_ever waiting\_\_\_\_\_ ;labour \_\_\_\_\_ strong-will turns up something. Luck \_\_\_\_\_ news of a legacy; labour \_\_\_\_\_ the foundation of competence. Luck \_\_\_\_\_on chance, labour \_\_\_\_\_ character.

#### **UNIT-IV**

7. A) Write an Essay on 'Terrorism, a social evil' (7M)  
B) Draft an E-Mail to your friend about your career plans. (7M)

**(OR)**

8. A) Write an essay on 'Facing a book vis-à-vis Facebook' (7M)  
B) Present an argument in about 250 words on 'Technology replacing Teachers'. Substantiate your argument with reasons. (7M)

#### **UNIT-V**

9. A) Write a feasibility report on 'Setting up a Water / Power Unit at your campus.' (7M)  
ii. Write a report on Educational Tour

B) Draft a pamphlet on any Electronic home appliances/Places of tourists' interest/an Educational institution/ an exhibition. (7M)

**(OR)**

- 10.A) Write a feasibility report on 'Educational Tour'. (7M)  
B) Write a letter to a renowned person, requesting him to be the Chief Guest for the cultural festival of your college. (7M)

**[B17 BS 1101]**

[B17 BS 1102]  
I B. Tech I Semester(R17) Regular Examinations  
**MATHEMATICS-I**  
(Common to all branches)

**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT – I**

1. (a) Solve  $\frac{dy}{dx} + (\tan x)y = (\sec x)y^3$ . (7M+7M)  
(b) Find the orthogonal trajectories of the family of parabolas  $ay^2 = x^3$ .

**(OR)**

2. (a) Solve  $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$ . (7M+7M)  
(b) A body originally at  $80^\circ C$  cools down to  $60^\circ C$  in 20 minutes, the temperature of air being  $40^\circ C$ . What will be the temperature of the body after 40 minutes from the original?

**UNIT - II**

3. (a) Solve  $(D^3 - D)y = 2x + 1 + 4 \cos x$ . (7M+7M)  
(b) solve  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x \log x$  by the method of variation of parameters.

**(OR)**

4. (a) solve  $(D^2 + 3D + 2)y = e^{e^x}$ . (7M+7M)  
(b) The differential equation for a circuit in which self inductance and capacitance neutralize each other is  $L \frac{d^2i}{dt^2} + \frac{i}{C} = 0$ . Find the current  $i$  as a function of  $t$ , given that  $i$  is maximum current and  $i = 0$  when  $t = 0$ .

**UNIT - III**

5. (a) Find  $L\{t \cos at\}$  and  $L\left\{\int_0^t e^{-t} \cos t dt\right\}$ . (7M+7M)  
(b) Using convolution theorem evaluate  $L^{-1}\left\{\frac{1}{(s+a)(s+b)}\right\}$ .

**(OR)**

6. (a) Find  $L^{-1}\left\{\frac{5s+3}{(s-1)(s^2+2s+5)}\right\}$ . (7M+7M)

- (b) Solve  $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 3y = e^{-t}$ ,  $y(0) = y'(0) = 1$  by using Laplace transforms.

#### UNIT – IV

7. (a) If  $U = \tan^{-1} \frac{x^3+y^3}{x-y}$  and  $x U_x + y U_y = \sin 2U$ , prove that

$$x^2 U_{xx} + 2xy U_{xy} + y^2 U_{yy} = 2 \cos 3U \sin U. \quad (7M+7M)$$

(b) If  $u = x^2 - 2y^2$ ,  $v = 2x^2 - y^2$  where  $x = r \cos \theta$ ,  $y = r \sin \theta$

show that  $\frac{\partial(u,v)}{\partial(r,\theta)} = 6 r^3 \sin 2\theta$ .

**(OR)**

8. (a) Expand  $x^2y + 3y - 2$  in powers of  $(x - 1)$  and  $(y + 2)$  using Taylor's theorem.

(7M+7M)

(b) By using the method of differentiation under the integral sign

prove that  $\int_0^\infty \frac{\tan^{-1}(ax)}{x(1+x^2)} dx = \frac{\pi}{2} \log(1+a)$ ,  $a \geq 0$ .

#### UNIT – V

9. (a) Solve  $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ .

(7M+7M)

(b) solve  $(D^2 - DD' - 2D'^2)z = (y-1)e^x$ .

**(OR)**

10. (a) Solve  $x(y-z)p + y(z-x)q = z(x-y)$ .

(7M+7M)

(b) solve  $(D + D' - 1)(D + 2D' - 3)z = 3x + 6y + 4$ .

[B17 BS 1103]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**MATHEMATICS-II**  
**(Mathematical Methods)**  
 (Common to CSE,ECE & IT)

**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT - I**

1.a) Find a root of  $x^3 - x - 11 = 0$  using the bisection method correct to three decimal places. (7M+7M)

b) Find the cube root of 41 using Newton-Raphson method.

**(OR)**

2. a) Find a real root of the equation  $x \log_{10} x = 1.2$  by Regula-false method correct to three decimal places. (7M+7M)

b) Find the positive root of the equation  $3x = \cos x + 1$  by iteration method.

**UNIT - II**

3. a) Using Gauss forward difference formula, Find Y (8), from the following table (7M+7M)

X	0	5	10	15	20	25
Y	7	11	14	18	24	32

b) Find the interpolating polynomial f(x) for the data of the following table

x	0	1	4	5
f(x)	4	3	24	39

**(OR)**

4. a) Using Gauss backward formula, find f(42), from the following table (7M+7M)

X	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

b) Using Lagrange's interpolation formula find Y(10) from the following table

x	5	6	9	11
Y	12	13	14	16

**UNIT - III**

5. a) Evaluate  $\int_0^2 \frac{dx}{x^3 + x + 1}$  by using Simpsons  $1/3^{\text{rd}}$  rule with  $h = 0.25$  (7M+7M)

b) Evaluate  $y(0.8)$  using Runge Kutta method given  $y' = (x + y)^{\frac{1}{2}}$ ,  $y(0.4) = 0.41$

**(OR)**

6. a) A rocket is launched from the ground. Its acceleration  $a(t)$  measured every 5 seconds is tabulated below. Use trapezoidal rule to find the velocity and the position of the rocket at  $t = 40$  seconds. (7M+7M)

t	0	5	10	15	20	25	30	35	40
a(t)	40.0	45.25	48.50	51.25	54.35	59.48	61.5	64.3	68.7

- b) Given  $y' = x + \sin y$ ,  $y(0) = 1$ , compute  $y(0.2)$  and  $y(0.4)$  with  $h = 0.2$  using modified Euler's method.

#### UNIT – IV

7. a) Find the Fourier series to represent  $f(x) = x - x^2$  from  $x = -\pi$  to  $x = \pi$ . (7M+7M)

- b) Obtain the sine series for  $f(x) = x$  in  $0 \leq x \leq \pi$ .

(OR)

8. a) Obtain the Fourier series for the function  $f(x) = \begin{cases} \pi x, & 0 \leq x < 1 \\ \pi(2 - x), & 1 \leq x \leq 2 \end{cases}$  and deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ . (7M+7M)

- b) Find half range cosine series for  $f(x) = x(2 - x)$  in  $0 < x < 2$ .

#### UNIT – V

9. a) Find the Fourier Transform of  $\frac{1}{\sqrt{|x|}}$ . (7M+7M)

- b) Find the Fourier integral representation for  $f(x) = \begin{cases} 1 - x^2, & \text{for } |x| \leq 1 \\ 0, & \text{for } |x| > 1 \end{cases}$

(OR)

10. a) Find the inverse Fourier transform  $f(x)$  of  $F_s(p) = \frac{p}{1+p^2}$ . (7M+7M)

- b) Find the Fourier cosine transform of  $e^{-ax}$ . Hence evaluate  $\int_0^{\infty} \frac{\cos \lambda x}{x^2 + a^2} dx$

[B17 BS 1104]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**ENGINEERING PHYSICS**  
**(Common to CSE,ECE & IT)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT – I**

1. (a) Describe the interference phenomena In thin transparent films for reflected light and obtain the conditions for maxima and minima. [7M]  
(b) Discuss the Fraunhofer diffraction of monochromatic light at a single slit. [7M]

**(OR)**

2. (a) Describe, with a neat sketch, the design and working of Michelson's interferometer. [7M]  
(b) Explain how the resolving power of a grating can be determined. [7M]

**UNIT – II**

3. (a) Differentiate spontaneous and stimulated emission processes and obtain the Einstein's relation for spontaneous to stimulated emission coefficients. [7M]  
(b) Define numerical aperture of an optical fiber and derive an expression for the same. [7M]

**(OR)**

4. (a) With neat sketches, explain the principle and working of He – Ne gas laser system. [7M]  
(b) Explain the characteristics of lasers and mention the applications of lasers. [7M]

**UNIT – III**

5. (a) Discuss the electric fields induced due to time varying magnetic fields and deduce the Faraday's law. [7M]  
(b) Describe any one method of detecting ultrasonics and mention the important applications of Ultrasonics. [7M]

**(OR)**

6. (a) Explain the concept of displacement current, and describe the significance of Maxwell's equations. [7M]  
(b) What is magnetostriction and describe the magnetostriction method of producing Ultrasonics. [7M]

**UNIT – IV**

7. (a) What are matter waves and describe an experiment confirming the wave nature of electrons. [7M]  
(b) What are the salient features of Kronig - Penny model. [7M]

**(OR)**

8. (a) Explaining the physical significance of wave function of a particle derive the Schrodinger's time independent wave equation. [7M]  
(b) Using band theory of solids how do you classify the materials. [7M]

### UNIT - V

9. (a) What is a unit cell and describe the different crystal systems possible in solids. [7M]  
(b) What are nano materials and explain the chemical vapour deposition method of fabricating nano materials. [7M]
- (OR)
10. (a) Define packing fraction and deduce the packing fraction for a simple cubic structure. [7M]  
(b) Define the basic approaches of fabricating nano materials and discuss the sol-gel method. [7M]

[B17 BS 1105]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**ENGINEERING CHEMISTRY**  
**(Common to CIV, EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT - I**

1. (a) Explain the mechanism of free radical Polymerization reaction with a suitable example. [7M]  
(b) Distinguish between thermoplastic and thermosetting resins. [7M]

**(OR)**

2. (a) What are conducting Polymers? Discuss the applications of conducting Polymers. [7M]  
(b) Write notes on Bu Na – S and Bu Na – N. [7M]

**UNIT - II**

3. (a) Explain the Proximate analysis of coal and give its significance. [7M]  
(b) Explain the fractional distillation of crude oil. [7M]

**(OR)**

4. (a) Write notes on (i) Knocking (ii) CNG [7M]  
(b) How Synthetic Petrol can be prepared by Bergius Process. [7M]

**UNIT - III**

5. (a) Explain the mechanism of electrochemical theory of corrosion with neat diagram. [7M]  
(b) Describe briefly about cathodic Protection. [7M]

**(OR)**

6. (a) Explain Hydrogen – Oxygen fuel cell with neat cell diagram [7M]  
(b) Discuss on various constituents of Paint. [7M]

**UNIT - IV**

7. (a) What is hardness? How it is determined by EDTA method? Explain. [7M]  
(b) Describe with equations how water can be softened using Lime & Soda Process [7M]

**(OR)**

8. (a) Discuss various sterilizing methods used in municipal water treatment. [7M]  
(b) Illustrate the reverse osmosis Process with a neat diagram. [7M]

**UNIT - V**

9. (a) Discuss chemistry involved in setting and hardening of cement? [7M]  
(b) What are refractories? Discuss the classification of refractories. [7M]

**(OR)**

10. (a) Write the engineering applications of Liquid Crystals. [7M]  
(b) Explain the stoichiometric defects in crystals. [7M]

[B17 BS 1105]

[B17 CS 1101]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**COMPUTER PROGRAMMING USING C**  
**(Common to CSE,ECE & IT)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. a) Discuss about computer languages. [7M]  
b) Explain c tokens. [7M]

**(OR)**

2. a) Explain different c operators. [7M]  
b) write about algorithm, pseudo code and flowchart. [7M]

**UNIT-II**

3. a) Discuss various looping techniques in c. [7M]  
b) Write a c program for summation of n numbers. [7M]

**(OR)**

4. a) Explain 2-D arrays and character arrays in c. [7M]  
b) Write a c program to find frequency of characters of a string. [7M]

**UNIT-III**

5. a) Explain parameter passing techniques in c. [7M]  
b) Write a c program for towers of Hanoi using recursive function. [7M]

**(OR)**

6. a) Explain storage classes in c. [7M]  
b) Write a c program for Fibonacci series using recursive function. [7M]

**UNIT-IV**

7. a) What is a pointer? How pointer variables are initialized. [7M]  
b) Write a program to print command line arguments on the screen. [7M]

**(OR)**

8. a) Discuss character pointers with examples. [7M]  
b) Write a c program to pass pointer variables as function arguments. [7M]

**UNIT-V**

9. a) Explain the difference between structure and union and write a program to find sum of marks in 3 subjects for a student using structures. [7M]  
b) Explain different bit-wise operators in c. [7M]

**(OR)**

10. a) Explain about the input and output operations of a file. [7M]  
b) Write a c program to open a file and to print its contents on screen. [7M]

[B17 CS 1101]

[B17 CE 1101]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**ENVIRONMENTAL STUDIES**  
**(Common to all Branches)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.  
All questions carry equal marks.

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**UNIT-I**

- 1 a). Define Environment. Write the scope and importance of the environmental studies. [7M]  
b). Elucidate the concept of Global Environmental crisis. [7M]

**(OR)**

- 2 a). What is an ecosystem? Write the structure and functions of an ecosystem. [7M]  
b). Write a brief note on forest resources. [7M]

**UNIT-II**

- 3 a). Describe the values of Biodiversity. [7M]  
b). Write about in-situ and ex-situ conservation. [7M]

**(OR)**

- 4 a). Describe Biogeographical Classification of India. [7M]  
b). India as a mega-diversity habitat – Explain [7M]

**UNIT-III**

- 5 a). Effects of modern agriculture on land. [7M]  
b). What are the benefits and problems of dams? [7M]

**(OR)**

- 6 a). Write about floods and droughts? [7M]  
b). Discuss the impact of energy use on environment. [7M]

**UNIT-IV**

- 7 a). What are the causes, effects and control measures of air pollution? [7M]  
b). What is solid waste management? Explain its methods. [7M]

**(OR)**

- 8 a). Elucidate the results of population growth on environment? [7M]  
b). Write notes on Rain water harvesting with a neat sketch [7M]

**UNIT-V**

- 9 a). Mention the different environmental acts and write about one. [7M]  
b). Write notes on Environmental impact Assessment. [7M]

**(OR)**

- 10 a). Write short notes on any two environmental case studies. [7M]  
b). Write a report on a visit to an environmental polluted area? [7M]

[B17 CE 1101]

[B17 ME 1101]  
**I B. Tech I Semester (R 17) Regular Examinations**  
**ENGINEERING MECHANICS**  
**(Common to CIV,EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

Assume the missing data if any, suitably

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**UNIT-1**

1. (a) State and prove Varignon's theorem. [7 M]  
 (b) Two cylinders of diameter 100 mm and 50 mm, weighing 200 N and 50 N, respectively are placed in a trough as shown in Figure 1. Assuming smooth surfaces, find the reactions at the points of supports 1, 2, 3 and 4. [7 M]

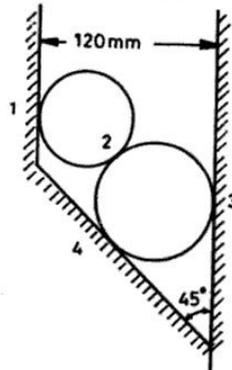


Figure 1

[OR]

- 2 (a) A string ABC of length  $l$  carries a small pulley C from which a Load  $W$  is suspended as shown in Figure 2. The string hangs between two vertical walls which are at a distance  $d$  apart. The end A is higher than the end B by height  $h$ . Find the position of equilibrium defined by the angle  $\alpha$ . Assume  $d = l/2$  and  $h = l/4$ . [7 M]

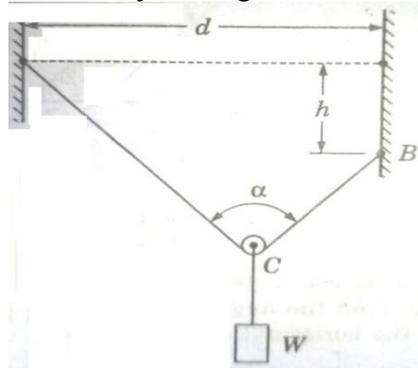


Figure 2

- (b) Two identical prismatic bars AB & CD each weighing 200 N are welded together to form a Tee and are suspended in a vertical plane as shown in Figure 3. Calculate the values of the  $\theta$  that the bar AB will make with the vertical when a vertical load of 200 N is applied at D. [7 M]

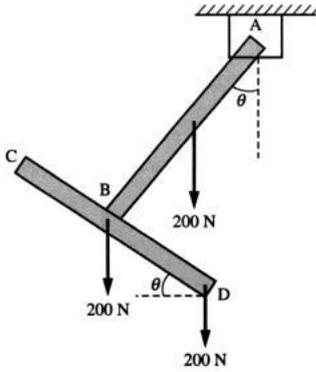


Figure 3

**UNIT-II**

- 3 (a) Derive the centroid of a wire bend in the form of a sector of an arc by taking the radius as 'r' and angle of sector as ' $\theta$ '. [7 M]  
 (b) Determine the centroid of the shaded segment for Figure 4 by taking  $a = 18$  m and  $\alpha = 45^\circ$ . [7 M]

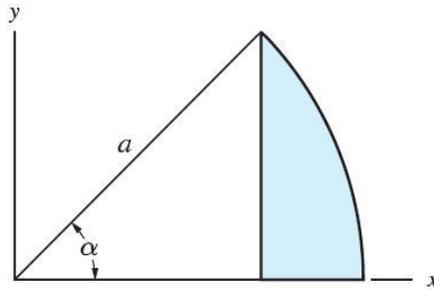


Figure 4

[OR]

- 4 (a) Derive the moment of inertia of triangle about its centroidal axis and also deduce the same about its base. [7 M]  
 (b) Determine the moment of Inertia of the T-section shown in Figure 5 about its centroidal axis. [7 M]

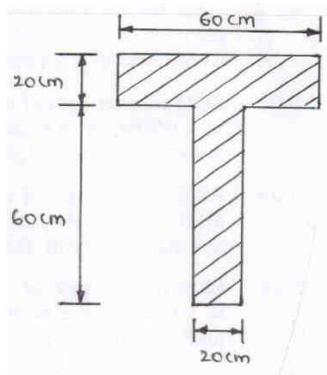


Figure 5

### UNIT-III

- 5 (a) Explain the terms angle of repose, cone of friction and write the laws of friction. [7 M]  
 (b) Referring to the Figure 6 given above, determine the least values of the force  $P$  to cause motion to impend right wards. Assume the coefficient of friction under the blocks to be 0.2 and pulley to be frictionless. [7 M]

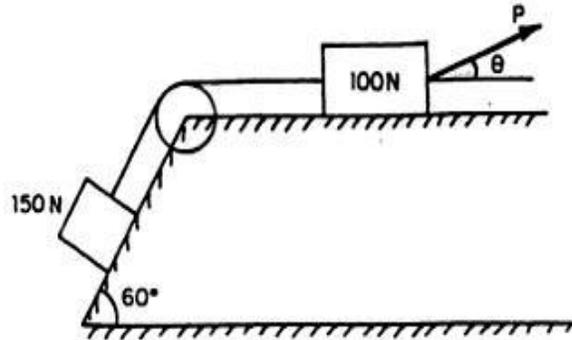


Figure 6

[OR]

- 6 (a) A uniform ladder 5m long on a horizontal ground and leans against a smooth vertical wall at an angle of  $70^\circ$  with the horizontal. The weight of the ladder is 90 N and acts at its middle. The ladder is at the point of sliding, when a man weighing 75N stands on a rung 3.5m from the top of the ladder. Calculate the co-efficient of the friction between the ladder and the floor. [7 M]

- (b) Find out the forces in all the members of a pin jointed truss as shown in Figure 7 by using method of Joints. [7 M]

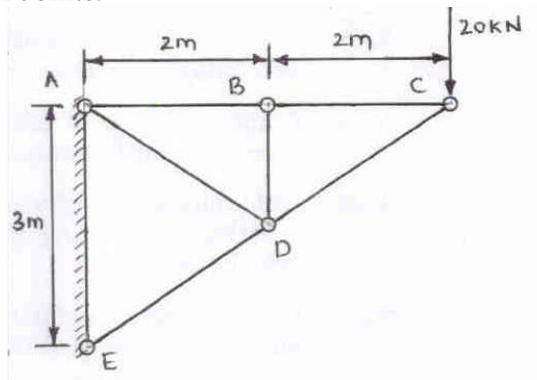


Figure 7

### UNIT-IV

- 7 (a) A stone is dropped from the top of a tower 60 m high. At the same instant, another stone is thrown vertically upwards from the foot of tower to meet the first stone at a height of 18 m. Determine (i) the time when the two stones meet; (ii) the velocity with which the second stone was thrown up. [7 M]  
 (b) Weight  $W$  and  $2W$  are supported in a vertical plane by a string and pulleys arranged as shown in Figure 8. Find the magnitude of an additional weight  $Q$  applied on the left which will give a downward acceleration  $a = 0.1g$  to the weight  $W$ . [7 M]

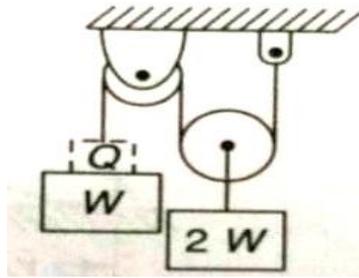


Figure 8

[OR]

- 8 (a) Define Time of Flight, Range and Maximum Height of a projectile. [7 M]  
 (b) Derive the general equation of projectile motion. [7 M]

UNIT-V

- 9 (a) A flywheel is rotating at 150 R.P.M. and after 8 seconds it is rotating at 120 R.P.M.. If the retardation is uniform, determine number of revolutions made by the flywheel and the time taken by the flywheel before it comes to rest from the speed of 150 R.P.M. [7 M]  
 (b) A rotor of weight  $W = 1720 \text{ N}$  and radius of gyration  $k = 100 \text{ mm}$  is mounted on a horizontal shaft and set in rotation by a falling weight  $W = 1720 \text{ N}$  as shown in Figure 9. If the system is released from rest, find the velocity of the block after it has fallen through a distance of 3 m. [7 M]

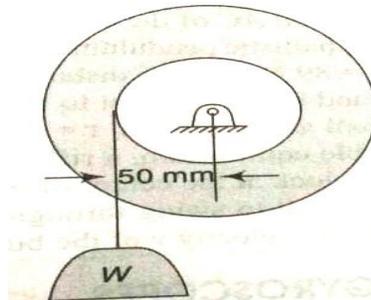


Figure 9

[OR]

- 10 (a) A body is rotating with an angular velocity of 8 radian/s. After 5 seconds, the angular velocity of the body becomes 28 radian/s. determine the angular acceleration of the body. [7 M]  
 (b) Three bodies, a sphere, a cylinder and a hoop each having the same mass and radius are released from rest from an inclined plane of angle  $\theta$ . Determine the velocity of each of the bodies after it has rolled down the incline plane through a distance  $s$ . [7 M]

[B17 ME 1102]  
**I B. Tech I Semester ( R 17) Regular Examinations**  
**ENGINEERING DRAWING**  
**(Common to CIV,EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

Assume the missing data if any, suitably

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**UNIT-I**

1. An inelastic string 145 mm long has its one end attached to the circumference of a circular disc of 40 mm diameter. Draw the curve traced out by the other end of the string, when it is completely wound around the disc, keeping the string always tight. [14 M]

[OR]

2. Two fixed points A and B are 100mm apart, Trace the complete path of a point P moving (in the same plane as that of A and B) in such a way that the sum of its distance from A and B is always the same and equal to 125mm. Name the curve and draw another curve parallel to and 25mm away from this curve. [14 M]

**UNIT-II**

3. A line AB, of 80 mm long has its end A, 15 mm in front of VP and 20 mm above HP. The other end B is 40 mm above HP and 50 mm in front of VP. Draw the projections of the line and determine the inclinations of the line with HP and VP. [14 M]

[OR]

4. (a) Draw the projections of a 75mm long straight line in the following positions: (i) parallel to and 30mm above the HP and in the VP; (ii) perpendicular to the VP, 25mm above the HP and its one end in the VP; (iii) Inclined at  $30^{\circ}$  to the HP and its one end 20mm above it, parallel to and 30mm in front of the VP. [7 M]

(b) Draw the projections of the following points on the same ground line, keeping the projectors 25mm apart. (i) Point A in the HP and lying 20mm behind the VP; (ii) Point B is 40mm above the HP and 25mm in front of the VP; (iii) Point C is 25mm below the HP and 25mm behind the VP; (iv) Point D is 15mm above the HP and 50mm behind the VP. [7 M]

**UNIT-III**

5. Draw a rhombus of diagonals 100 mm and 60 mm long, with the longer diagonal horizontal. The figure is the top view of a square of 100mm long diagonals, with a corner on the ground. Draw its front view and determine the angle which its surface makes with the ground. [14 M]

[OR]

6. A semicircular plate of 40mm diameter has its straight edge in the VP and inclined at  $45^{\circ}$  to the HP, the surface of the plate makes an angle of  $30^{\circ}$  with the VP. Draw its projections. [14 M]

### UNIT-IV

7. A hexagonal pyramid, base 25mm side and axis 50mm long, has an edge of its base on the ground. Its axis is inclined at  $30^\circ$  to the ground and parallel to the VP. Draw its projections. [14 M]

[OR]

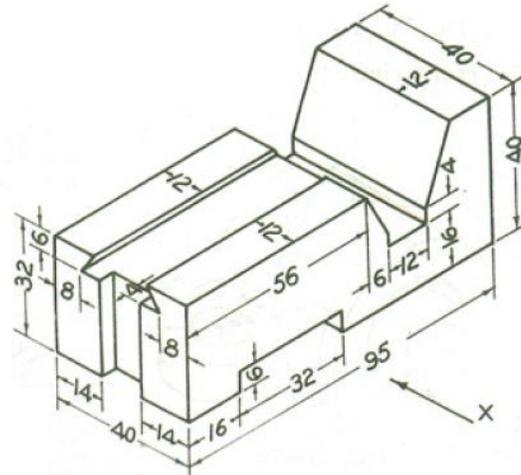
8. Draw the projections of a cylinder 75mm diameter and 100mm long, lying on the ground with its axis inclined at  $30^\circ$  to the VP and parallel to the ground. [14 M]

### UNIT-V

9. A square pyramid with base side 40mm and height 60mm is resting on a cube of sides 50mm, the axes of the cube and the pyramid being in the same line. Two sides of the base of the pyramid are parallel to the edges of the cube. Draw the isometric view. [14 M]

[OR]

10. Draw (i) Front View (ii) Top View (iii) Side View of the object shown below: [14 M]



All the dimensions are in mm

[B17 BS 1201]  
**I B. Tech II Semester ( R 17) Regular Examinations**  
**ENGLISH-II**  
**(Common to all Branches)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.  
All questions carry equal marks.

**UNIT-I**

1. A. i) Describe how education is the greatest resource. (4M)  
ii) Write a brief note on the great contribution made by Kalam to the science and technology. (3M)  
B. Imagine that you are a builder and draft a letter of tender quotation to the Chief Engineer of Department of Roads and Buildings of Karnataka for constructing an administrative building. (7M)
- (OR)**
2. A. i) What, according to the author, is the source of problems for civilizations? (4M)  
ii) Who had most influenced the value system of Kalam when he was young? (3M)  
B. Imagine that you are the managing Director of a big company that manufactures electronic goods like Music systems, DVDs, LCDs. Write a business letter addressed to the Board of directors requesting them to attend a meeting to be held in the ensuing month. Give the agenda of the meeting also. (7M)

**UNIT-II**

3. A. i) What is the layman's view of atomic bomb? How right is he in thinking so? Who do you think is to be held responsible for the destruction created by technology? Support your opinion with suitable examples. (4M)  
ii) What were some of the changes that Raman had initiated at the Indian Institute of Science? (3M)  
B. Make notes on the following passage. (7M)

Here is an excerpt from one of Abdul Kalam's essays.

Knowledge has many forms and it is available at many places. It is acquired through education, information, intelligence and experience. It is available in academic institutions with teachers, in libraries, in research papers, seminar proceedings and in various organizations and work places with workers, managers, in drawings, in process sheets and on the shop floors. Knowledge, though closely linked to education, comes equally from learning skills, such as those possessed by our artists, craftsmen, hakims, vaidyas, philosophers and saints, as also our housewives. Knowledge plays a very important role in their performance and output too. Our heritage and history, the rituals, epics and traditions that form part of our consciousness are also vast resources of knowledge as are our libraries and universities. There is an abundance of unorthodox, earthy wisdom in our villages. There are hidden treasures of knowledge in our environment, in the oceans, bio-reserves and deserts, in the plant and animal life. Every state in a country has a unique core competence for a knowledge society

**(OR)**

4. A. i) Describe any modern invention with its positive and negative effects on the society. (4M)  
ii) List out the awards and achievements of Sir C.V. Raman. (3M)  
B. Make notes on the following passage. (7M)  
It is not luck but labor that makes a man. Luck, says an American writer, is ever waiting for something to turn up; labour with keen eyes and strong will always turns up something. Luck lies in bed and wishes the postman would bring him news of a legacy; labour turns out at six and with busy pen and ringing hammer lays the foundation of competence. Luck whines, labour watches. Luck relies on

chance, labour on character. Luck slips downwards to self-indulgence; labour strides upwards and aspires to independence. The conviction, therefore, is extending that diligence is the mother of good luck. In other words, that a man's success in life will be proportionate to his efforts, to his industry, to his attention to small things.

### UNIT-III

5. A.(i)How should one avoid culture shock before experiencing it when one goes to a new place? What precautions would help in living peacefully in a new place of new culture? (4M)  
(ii)Explain in brief Baba's theory on the hitting of cosmic rays on earth's atmosphere (3M)
- B. Write a paragraph on one of the following ideas. (7M)  
i) Facebook ii) Barking dog seldom bites.  
(OR)

- 6.A i) How does a person become a cultural entity ? (4M)  
ii) Imagine that you have been elected as the Cultural Secretary of the Students' Association and you have to give a ten-minute speech outlining your plans for the academic year. Write out your speech in about 75 words. (3M)
- B. Write an essay on Homi Bhabha's life and his academic and professional journey. (7M)

### UNIT-IV

7. A i) How does Shirley Jackson trivialize the grave practice of the communities traditional stoning and what message might Jackson be trying to convey to the reader through the treatment of the characters' behavior? (4M)  
ii) What were two types of services devised by the British in the Indian Education Services? Why? (3M)
- B. Rewrite the following sentences correcting the errors: (7M)  
i. He plays football when he was free  
ii. He drunk coffee everyday when he was young  
iii. Had your breakfast in the morning?  
iv. He drunk coffee everyday when he was young.  
v. Had your breakfast in the morning?  
vi. Why haven't you been along with me for the event last month?  
vii. Never I have seen such a person!

(OR)

8. A. i) What is black box? Who made it? When and why is it significant? (4M)  
ii) Fill in the blanks with appropriate prepositions. (3M)  
a. She was senior\_\_\_ me when we were with the academic project \_\_\_\_\_some time.  
b. One who believes \_\_ and a devotee \_\_ God is a theist.  
c. He is angry\_\_ her behavior as she always lies \_\_\_ him.  
d. Write an essay on the contribution of J.C. Bose to the field of science. (7M)

### UNIT-V

9. A. i) How did the relationship between Microsoft and IBM begin? (4M)  
ii) Collocate the given words of the list A with those of the list B.
- | A             | B           |
|---------------|-------------|
| i. Resounding | enemies ( ) |
| ii. Bitter    | success ( ) |
| iii. Death    | blow ( )    |
- B. Write an essay on Dr. Prapulla Chandra Ray's life and his academic and professional journey (7M)

**(OR)**

10. A i) Describe How Gates worked for the development of Microsoft. (4M)  
ii) Describe the compound Ray discovered. What are its properties? (3M)  
B. Write a business report on 'Setting up a Pharmaceutical Lab and Manufacturing Unit at Visakhapatnam, Andhra Pradesh. (7M)

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[B17 BS 1202]  
**I B. Tech II Semester (R 17) Regular Examinations**  
**MATHEMATICS-II**  
**(Mathematical Methods)**  
**(Common to CIV, EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT - I**

1. a) Find a root of  $x^3 - x - 11 = 0$  using the bisection method correct to three decimal places. (7M+7M)

b) Find the cube root of 41 using Newton-Raphson method.

**(OR)**

2. a) Find a real root of the equation  $x \log_{10} x = 1.2$  by Regula-false method correct to three decimal places. (7M+7M)

b) Find the positive root of the equation  $3x = \cos x + 1$  by iteration method.

**UNIT - II**

3. a) Using Gauss forward difference formula, Find Y (8), from the following table (7M+7M)

X	0	5	10	15	20	25
Y	7	11	14	18	24	32

b) Find the interpolating polynomial f(x) for the data of the following table

x	0	1	4	5
f(x)	4	3	24	39

**(OR)**

4. a) Using Gauss backward formula, find f(42), from the following table (7M+7M)

X	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

b) Using Lagrange's interpolation formula find Y(10) from the following table

x	5	6	9	11
Y	12	13	14	16

**UNIT - III**

5. a) Evaluate  $\int_0^2 \frac{dx}{x^3 + x + 1}$  by using Simpsons 1/3<sup>rd</sup> rule with  $h = 0.25$  (7M+7M)

b) Evaluate  $y(0.8)$  using Runge Kutta method given  $y' = (x + y)^{\frac{1}{2}}$ ,  $y(0.4) = 0.41$

**(OR)**

6. a) A rocket is launched from the ground. Its acceleration  $a(t)$  measured every 5 seconds is tabulated below. Use trapezoidal rule to find the velocity and the position of the rocket at  $t = 40$  seconds. (7M+7M)

t	0	5	10	15	20	25	30	35	40
a(t)	40.0	45.25	48.50	51.25	54.35	59.48	61.5	64.3	68.7

- b) Given  $y' = x + \sin y$ ,  $y(0) = 1$ , compute  $y(0.2)$  and  $y(0.4)$  with  $h = 0.2$  using modified Euler's method.

#### UNIT – IV

7. a) Find the Fourier series to represent  $f(x) = x - x^2$  from  $x = -\pi$  to  $x = \pi$ . (7M+7M)

- b) Obtain the sine series for  $f(x) = x$  in  $0 \leq x \leq \pi$ .

(OR)

8. a) Obtain the Fourier series for the function  $f(x) = \begin{cases} \pi x, & 0 \leq x < 1 \\ \pi(2 - x), & 1 \leq x \leq 2 \end{cases}$  and deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ . (7M+7M)

- b) Find half range cosine series for  $f(x) = x(2 - x)$  in  $0 < x < 2$ .

#### UNIT – V

9. a) Find the Fourier Transform of  $\frac{1}{\sqrt{|x|}}$ . (7M+7M)

- b) Find the Fourier integral representation for  $f(x) = \begin{cases} 1 - x^2, & \text{for } |x| \leq 1 \\ 0, & \text{for } |x| > 1 \end{cases}$

(OR)

10. a) Find the inverse Fourier transform  $f(x)$  of  $F_s(p) = \frac{p}{1+p^2}$ . (7M+7M)

- b) Find the Fourier cosine transform of  $e^{-ax}$ . Hence evaluate  $\int_0^{\infty} \frac{\cos \lambda x}{x^2 + a^2} dx$

[B17 BS 1203]  
**I B. Tech II Semester ( R 17) Regular Examinations**  
**MATHEMATICS-III**  
**(Common to all Branches)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

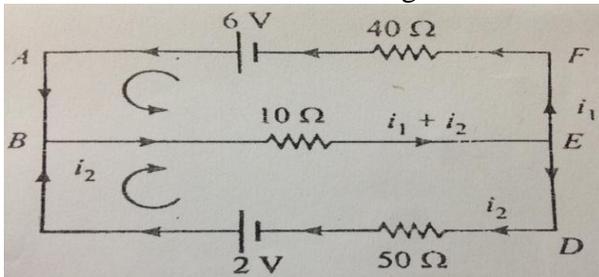
Answer **ONE Question** from **EACH UNIT**.  
 All questions carry equal marks.

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**UNIT - I**

- 1.a) Solve the system of equations  $20x + y - 2z = 17$ ,  $3x + 20y - z = -18$ ,  
 $2x - 3y + 20z = 25$  by Gauss –Siedel method. (7M+7M)

- b) Find the currents in the following circuit.



(OR)

2. a) Solve the system of equations  $10x + y + z = 12$ ,  $2x + 10y + z = 13$ ,  $2x + 2y + 10z = 14$  by Gauss-elimination method. (7M+7M)

- b) Define rank and find the rank of the matrix A by reducing it in to its normal form where

A is: 
$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

**UNIT - II**

3. a) Verify Cayley-Hamilton theorem and find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix} \quad (7M+7M)$$

- b) Reduce the quadratic form  $2x^2 + 2y^2 + 2z^2 - 2xy - 2yz - 2zx$  to canonical form by orthogonal transformation and hence find rank, index, signature and nature of the quadratic form.

(OR)

4. a) Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix} \quad (7M+7M)$$

- b) If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ , use Cayley-Hamilton theorem to find the value of  $2A^5 - 3A^4 + A^2 - 4I$ . Also find the inverse of A.

### UNIT - III

5. a) Evaluate  $\int_0^a \int_{\frac{x^2}{a}}^{2a-x} xy^2 dy dx$  by changing the order of integration. (7M+7M)

b) Establish the relation between Beta and Gamma functions.

(OR)

6. a) Evaluate  $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$  by changing in to polar coordinates and hence deduce

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}. \quad (7M+7M)$$

b) Express  $\int_0^1 x^m (1-x^n)^p dx$  in terms of  $\Gamma$  functions and hence evaluate

$$\int_0^1 x^5 (1-x^3)^{10} dx.$$

### UNIT - IV

7. a) Find the directional derivative of  $\phi(x, y, z) = x^2yz + 4xz^2$  at the point (1,-2,-1) in the direction of the normal to the surface  $f(x, y, z) = x \log z - y^2$  at (-1,2,1). (7M+7M)

b) Prove that  $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$  and  $\text{curl}(\text{grad } \phi) = 0$  for any scalar function  $\phi$ .

(OR)

8. a) Show that the vector field  $\vec{F} = (x^2 + xy^2)\vec{i} + (y^2 + x^2y)\vec{j}$  is conservative and find the scalar potential function. (7M+7M)

b) Find the constants a, b such that the surfaces  $5x^2 - 2yz - 9x = 0$  and  $ax^2y + bz^3 = 4$  cut orthogonally at (1,-1,2).

### UNIT - V

9. a) Evaluate by Green's theorem  $\oint_C [(y - \sin x)dx + \cos x dy]$  where C is the triangle enclosed by the lines  $y=0, x=\pi/2, y=2x/\pi$ . (7M+7M)

b) State Gauss Divergence theorem and use it to evaluate  $\iint_S \vec{u} \cdot \vec{n} ds$  where  $\vec{u} = \vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$  and S is the surface of the sphere  $x^2 + y^2 + z^2 = 9$ .

(OR)

10. a) State Green's theorem in a plane and apply the theorem to evaluate

$$\oint_C (x^2y dx + y^3 dy) \text{ where C is the closed path formed by } y=x \text{ and } y=x^3 \text{ from } (0,0) \text{ to } (1,1). \quad (7M+7M)$$

b) Evaluate by Stokes' theorem  $\oint_C [(x+y)dx + (2x-z)dy + (y+z)dz]$  where C is the boundary of the triangle with vertices (0,0,0), (1,0,0) and (1,1,0)

[B17 BS 1204]  
**I B. Tech II Semester (R 17) Regular Examinations**  
**ENGINEERING PHYSICS**  
**(Common to CIV,EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.  
All questions carry equal marks.

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**UNIT – I**

1. (a) Describe the interference phenomena in thin transparent films for reflected light and obtain the conditions for maxima and minima. [7M]
- (b) Discuss the Fraunhofer diffraction of monochromatic light at a single slit. [7M]

**(OR)**

2. (a) Describe, with a neat sketch, the design and working of Michelson's interferometer. [7M]
- (b) Explain how the resolving power of a grating can be determined. [7M]

**UNIT – II**

3. (a) Differentiate spontaneous and stimulated emission processes and obtain the Einstein's relation for spontaneous to stimulated emission coefficients. [7M]
- (b) Define numerical aperture of an optical fiber and derive an expression for the same. [7M]

**(OR)**

4. (a) With neat sketches, explain the principle and working of He – Ne gas laser system. [7M]
- (b) Explain the characteristics of lasers and mention the applications of lasers. [7M]

**UNIT – III**

5. (a) Discuss the electric fields induced due to time varying magnetic fields and deduce the Faraday's law. [7M]
- (b) Describe any one method of detecting ultrasonics and mention the important applications of Ultrasonics. [7M]

**(OR)**

6. (a) Explain the concept of displacement current, and describe the significance of Maxwell's equations. [7M]
- (b) What is magnetostriction and describe the magnetostriction method of producing Ultrasonics. [7M]

**UNIT – IV**

7. (a) What are matter waves and describe an experiment confirming the wave nature of electrons. [7M]
- (b) What are the salient features of Kronig - Penny model. [7M]

**(OR)**

8. (a) Explaining the physical significance of wave function of a particle derive the Schrodinger's time independent wave equation. [7M]
- (b) Using band theory of solids how do you classify the materials. [7M]

**UNIT - V**

9. (a) What is a unit cell and describe the different crystal systems possible in solids. [7M]  
(b) What are nano materials and explain the chemical vapour deposition method of fabricating nano materials. [7M]
- (OR)
10. (a) Define packing fraction and deduce the packing fraction for a simple cubic structure. [7M]  
(b) Define the basic approaches of fabricating nano materials and discuss the sol-gel method. [7M]

**[B17 BS 1204]**

[B17 BS 1205]  
**I B. Tech II Semester ( R 17) Regular Examinations**  
**ENGINEERING CHEMISTRY**  
**(Common to CSE,ECE & IT)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT - I**

1. (a) Explain the mechanism of free radical Polymerization reaction with a suitable example. [7M]  
(b) Distinguish between thermoplastic and thermosetting resins. [7M]
- (OR)**
2. (a) What are conducting Polymers? Discuss the applications of conducting Polymers. [7M]  
(b) Write notes on Bu Na – S and Bu Na – N. [7M]

**UNIT - II**

3. (a) Explain the Proximate analysis of coal and give its significance. [7M]  
(b) Explain the fractional distillation of crude oil. [7M]
- (OR)**
4. (a) Write notes on (i) Knocking (ii) CNG [7M]  
(b) How Synthetic Petrol can be prepared by Bergius Process. [7M]

**UNIT - III**

5. (a) Explain the mechanism of electrochemical theory of corrosion with neat diagram. [7M]  
(b) Describe briefly about cathodic Protection. [7M]
- (OR)**
6. (a) Explain Hydrogen – Oxygen fuel cell with neat cell diagram [7M]  
(b) Discuss on various constituents of Paint. [7M]

**UNIT - IV**

7. (a) What is hardness? How it is determined by EDTA method? Explain. [7M]  
(b) Describe with equations how water can be softened using Lime & Soda Process [7M]
- (OR)**
8. (a) Discuss various sterilizing methods used in municipal water treatment. [7M]  
(b) Illustrate the reverse osmosis Process with a neat diagram. [7M]

**UNIT - V**

9. (a) Discuss chemistry involved in setting and hardening of cement? [7M]  
(b) What are refractories? Discuss the classification of refractories. [7M]
- (OR)**
10. (a) Write the engineering applications of Liquid Crystals. [7M]  
(b) Explain the stoichiometric defects in crystals. [7M]

[B17 BS 1205]

[B17 CS 1201]  
**I B. Tech II Semester (R 17) Regular Examinations**  
**COMPUTER PROGRAMMING USING C**  
**(Common to CIV,EEE & ME)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. a) Discuss about computer languages. [7M]  
b) Explain c tokens. [7M]

**(OR)**

2. a) Explain different c operators. [7M]  
b) write about algorithm, pseudo code and flowchart. [7M]

**UNIT-II**

3. a) Discuss various looping techniques in c. [7M]  
b) Write a c program for summation of n numbers. [7M]

**(OR)**

4. a) Explain 2-D arrays and character arrays in c. [7M]  
b) Write a c program to find frequency of characters of a string. [7M]

**UNIT-III**

5. a) Explain parameter passing techniques in c. [7M]  
b) Write a c program for towers of Hanoi using recursive function. [7M]

**(OR)**

6. a) Explain storage classes in c. [7M]  
b) Write a c program for Fibonacci series using recursive function. [7M]

**UNIT-IV**

7. a) What is a pointer? How pointer variables are initialized. [7M]  
b) Write a program to print command line arguments on the screen. [7M]

**(OR)**

8. a) Discuss character pointers with examples. [7M]  
b) Write a c program to pass pointer variables as function arguments. [7M]

**UNIT-V**

9. a) Explain the difference between structure and union and write a program to find sum of marks in 3 subjects for a student using structures. [7M]  
b) Explain different bit-wise operators in c. [7M]

(or)

10. a) Explain about the input and output operations of a file. [7M]  
b) Write a c program to open a file and to print its contents on screen. [7M]

[B17 CS 1201]

[B17 CS 1202]  
**I B. Tech II Semester ( R 17) Regular Examinations**  
**OBJECT ORIENTED PROGRAMMING**  
**THROUGH C++**  
**(COMPUTER SCIENCE & ENGINEERING)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.  
All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

1. A. What are the features of object programming language? [7M]  
B. List the drawbacks of conventional programming? [7M]

**(OR)**

2. A. Explain array of objects with a suitable program? [7M]  
B. Explain inline function with an example? [7M]

**UNIT-II**

3. A. Explain constructor overloading with an example? [7M]  
B. Explain assignment overloading with a suitable example? [7M]

**(OR)**

4. A. Explain Dynamic initialization of Objects? [7M]  
B. What is operator overloading? Write a C++ program illustrating overloading binary operators? [7M]

**UNIT-III**

5. A. Explain the concepts of pointers to objects? [7M]  
B. What is virtual base class? Write a C++ program illustrating virtual base classes? [7M]

**(OR)**

6. A. Explain virtual function with an example? [7M]  
B. Explain hybrid inheritance with an example? [7M]

**UNIT-IV**

7. A. What is an Exception? Explain about try, throw and catch with example? [7M]  
B. Explain unformatted I/O operations with examples? [7M]

**(OR)**

8. A. Explain the principles of exception handling? [7M]  
B. What are the String Characteristics? [7M]

**UNIT-V**

9. A. Explain about different types of containers? [7M]  
B. Write a program for bubble sort using function templates? [7M]
- (OR)**
10. A. Explain the concepts of command line arguments. [7M]  
B. Explain differences between templates and macros? [7M]

**[B17 CS 1202]**

**[B17 CS 1203]**

**I B. Tech II Semester (R 17) Regular Examinations**  
**DATA STRUCTURES**  
**(Electronics and Communication Engineering)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. A) Define data structure. Discuss different types of data structure their implementations applications. (7M)  
B) Implement binary search technique using recursion. (7M)
- (OR)**
2. A) What is an array? Discuss different types of array with examples. (7M)  
B) Rearrange following numbers using quick sort: (7M)  
10, 6, 3, 7, 17, 26, 56, 32, 72

**UNIT-II**

3. A) Write an algorithm for basic operations of stack. (7M)  
B) Explain the procedure to evaluate postfix expression. Evaluate the following postfix expression  $7\ 3\ 4\ +\ -\ 2\ 4\ 5\ /\ +\ * \ 6\ / \ 7\ +\ ?$  (7M)
- (OR)**
4. A) Define Queue. Explain the operations of queue using arrays. (7M)  
B) Explain the advantages of circular queue (7M)

**UNIT-III**

5. A) Define pointer. Explain Dynamically allocated storage using pointers. (7M)  
B) Write an Algorithm for the operations of Linked stack (7M)
- (OR)**
6. A) Write an Algorithm for the operations of single Linked list (7M)  
B) Explain polynomial addition using Linked List (7M)

**UNIT-IV**

7. A) What is a Binary tree. Explain threaded binary tree. (7M)  
B) Explain Binary tree traversal techniques. (7M)
- (OR)**
8. A) Explain the operations of Binary search trees. (7M)  
B) Define Max Heap. Write an algorithm for deletion of elements from Max Heap. (7M)

**UNIT-V**

9. A) What is a graph? Explain the properties of graphs. (7M)  
B) Write breadth first traversal algorithm. Explain with an example. (7M)
- (OR)**
10. A) Define Minimum spanning tree. Explain Kruskal's Algorithm. (7M)  
B) Write an Algorithm to find shortest path in a Graph (7M)

[B17 CS 1203]

[B17 ME 1201]

**I B. Tech II Semester (R 17) Regular Examinations**  
**ENGINEERING DRAWING**  
**(Common to CSE,ECE & IT)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

Assume the missing data if any, suitably

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**UNIT-I**

1. An inelastic string 145 mm long has its one end attached to the circumference of a circular disc of 40 mm diameter. Draw the curve traced out by the other end of the string, when it is completely wound around the disc, keeping the string always tight. [14 M]

[OR]

2. Two fixed points A and B are 100mm apart, Trace the complete path of a point P moving (in the same plane as that of A and B) in such a way that the sum of its distance from A and B is always the same and equal to 125mm. Name the curve and draw another curve parallel to and 25mm away from this curve. [14 M]

**UNIT-II**

3. A line AB, of 80 mm long has its end A, 15 mm in front of VP and 20 mm above HP. The other end B is 40 mm above HP and 50 mm in front of VP. Draw the projections of the line and determine the inclinations of the line with HP and VP. [14 M]

[OR]

4. (a) Draw the projections of a 75mm long straight line in the following positions: (i) parallel to and 30mm above the HP and in the VP; (ii) perpendicular to the VP, 25mm above the HP and its one end in the VP; (iii) Inclined at  $30^\circ$  to the HP and its one end 20mm above it, parallel to and 30mm in front of the VP. [7 M]

(b) Draw the projections of the following points on the same ground line, keeping the projectors 25mm apart. (i) Point A in the HP and lying 20mm behind the VP; (ii) Point B is 40mm above the HP and 25mm in front of the VP; (iii) Point C is 25mm below the HP and 25mm behind the VP; (iv) Point D is 15mm above the HP and 50mm behind the VP. [7 M]

**UNIT-III**

5. Draw a rhombus of diagonals 100 mm and 60 mm long, with the longer diagonal horizontal. The figure is the top view of a square of 100mm long diagonals, with a corner on the ground. Draw its front view and determine the angle which its surface makes with the ground. [14 M]

[OR]

6. A semicircular plate of 40mm diameter has its straight edge in the VP and inclined at  $45^\circ$  to the HP, the surface of the plate makes an angle of  $30^\circ$  with the VP. Draw its projections. [14 M]

#### UNIT-IV

7. A hexagonal pyramid, base 25mm side and axis 50mm long, has an edge of its base on the ground. Its axis is inclined at  $30^\circ$  to the ground and parallel to the VP. Draw its projections. [14 M]

[OR]

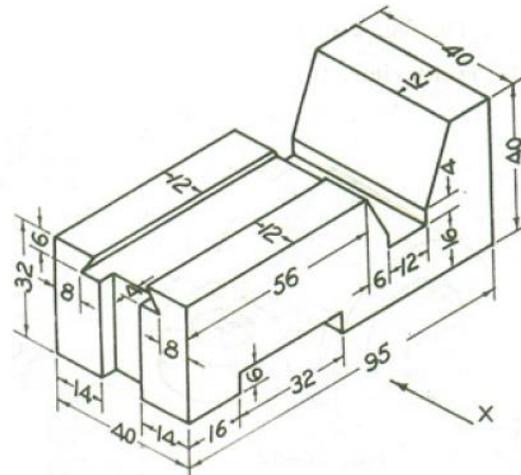
8. Draw the projections of a cylinder 75mm diameter and 100mm long, lying on the ground with its axis inclined at  $30^\circ$  to the VP and parallel to the ground. [14 M]

#### UNIT-V

9. A square pyramid with base side 40mm and height 60mm is resting on a cube of sides 50mm, the axes of the cube and the pyramid being in the same line. Two sides of the base of the pyramid are parallel to the edges of the cube. Draw the isometric view. [14 M]

[OR]

10. Draw (i) Front View (ii) Top View (iii) Side View of the object shown below: [14 M]



All the dimensions are in mm

[B17 ME 1201]

[B17 CE 1201]

I B. Tech II Semester (R 17) Regular Examinations

**BUILDING MATERIALS AND CONSTRUCTION**  
**(For Civil)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

1. a) Explain the classification of bricks. (Including IS classification) [7 M]  
b) Explain the following clay products: [7 M]  
    i) Stoneware  
    ii) Terra-cotta

**(OR)**

2. a) Explain the term “Quarrying of stones”? [7 M]  
b) Classify tiles and explain them with neat sketches. [7 M]

**UNIT-II**

3. a) What is seasoning of timber? Explain the defects due to seasoning of timber. [7 M]  
b) Explain the following wood based products: [7 M]  
    i) Block Boards  
    ii) Particle Boards

**(OR)**

4. a) List various classifications of plywood. [7 M]  
b) Draw the cross-section of a tree and explain the various details. [7 M]

**UNIT-III**

5. a) Define Specific gravity, Bulk density and Porosity of aggregates. [7 M]  
b) Explain the manufacturing process of cement by “Dry” process? [7 M]
- (OR)**
6. a) Explain the term “Bulking of sand”? [7 M]  
b) State and explain various laboratory tests for testing OPC? [7 M]

**UNIT-IV**

7. a) What are FAL-G blocks and Concrete blocks [7 M]  
b) What are the characteristics of an ideal paint? [7 M]
- (OR)**

8. a) Explain various closers in Brick masonry with neat sketches? [7 M]  
b) What is a foundation? Explain different types of foundations? [7 M]

**UNIT-V**

9. a) What is Roofing? Explain Madras terrace Roof? [7 M]  
b) Define Form work and explain the different types of form work. [7 M]

**(OR)**

10. a) What is Scaffolding? Explain the different types of Scaffoldings? [7 M]  
b) List out various staircases and explain any two them with neat sketches. [7 M]

**[B17 CE 1201]**

**[B17 EC 1201]**

**I B. Tech II Semester (R 17) Regular Examinations**

**ELEMENTS OF ELECTRONICS ENGINEERING  
(Common to CSE & IT)  
MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

**UNIT I**

1. a) Explain in detail about drift and diffusion currents. (7M)
- b) Explain Hall Effect and its applications in detail. (7M)

**OR**

2. a) What are the differences between Avalanche breakdown and Zener Breakdown. (7M)
- b) Explain the basic operation of semiconductor diode with v-I characteristics. (7M)

**UNIT II**

3. a) Explain the V-I Characteristic of Zener Diode, and state its applications. (7M)
- b) Explain Tunneling phenomenon and V-I Characteristics of Tunnel diode. (7M)

**OR**

4. a) Derive expression for the ripple factor and efficiency of half wave rectifier without filter. (7M)
- b) With neat diagram, explain the operation of full wave rectifier and obtain expression for with filter Ripple factor. (7M)

**UNIT III**

5. a) Plot the input and output characteristics of transistor in CE configuration and explain the shape of the characteristics. (7M)
- b) What is early effect and what are its consequences. (7M)

**OR**

6. a) Plot the input and output characteristics of the transistor in CB configuration and explain shape of the curves. (7M)
- b) Define  $\alpha$  and  $\beta$ . Derive the relation between  $\alpha$  and  $\beta$ . (7M)

**UNIT IV**

7. a) Draw and explain the Self biasing circuit. Derive an expression for Stability factor S. (7M)
- b) Explain the phenomenon of Thermal runaway. (7M)

**OR**

8. a) Explain any two types of bias compensation. (7M)
- b) What are the reasons for the instability of operating point? Briefly explain the methods of stabilization of operating point. (7M)

**UNIT V**

9. a) Explain the operation of JFET with Drain and Transfer characteristics. (7M)
- b) What are the differences between JFET and BJT? (7M)

**OR**

10. a) Explain the operation of Enhancement MOSFET in details. (7M)
- b) Define  $g_m$ ,  $r_d$  and  $\mu$  of JFET and give the relation between them. (7M)

[B17 EC 1201]

[B17 EE 1201]

**I B. Tech II Semester (R 17) Regular Examinations**

**CIRCUIT THEORY**  
**(Electrical Electronics Engineering)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.  
 All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

1. a) Obtain the expressions for star-delta and delta-star equivalence of resistive network. (7M)
- b) Find the value of resistance R, if the current is  $I=11$  A and source voltage is 66 V as shown in figure. (7M)

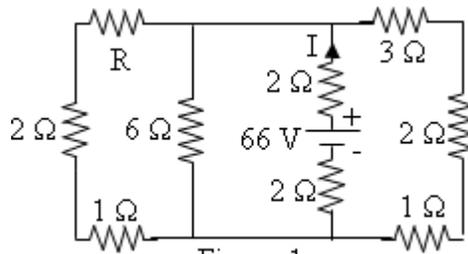


Figure:1

**(OR)**

2. a) Explain Source Transformation with suitable examples. (7M)
- b) Use the nodal analysis to determine voltage at node 1 and the power supplied by the dependent current source in the network shown in figure. (7M)

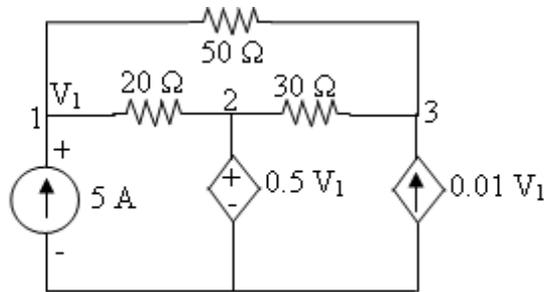


Figure:2

**UNIT-II**

- 3.a) Explain the procedure for obtaining fundamental tie-set matrix of given network. (7M)
- b) Draw the oriented graph of a network with fundamental cut-set matrix as shown below.(7M)

Twigs				Links		
1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

Also find number of cut-sets and draw them.

**(OR)**

- 4.a) For the network graph shown in figure, draw all possible trees. For any one of these trees, prepare a cut-set schedule and obtain the relation between tree-branch voltages and branch voltages. (7M)

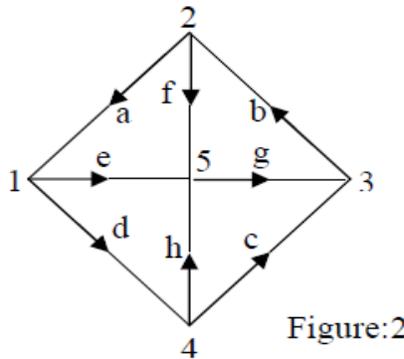


Figure:2

- b) Describe the procedure to construct the dual of a network with an example. (7M)

### UNIT-III

- 5.a) A ring has a mean diameter of 21 cm and cross sectional area of 10 cm<sup>2</sup>. The ring is made up of semi-circular sections of cast iron and cast steel with each joint having reluctance equal to an air gap of 0.2 mm. Find the ampere turns required to produce a flux of 0.8 milli Wb. The relative permeability of cast steel and cast iron are 800 & 166 respectively. Neglect fringing and leakage effects. (7M)
- b) Two identical coupled coils have an equivalent inductance of 80 mH when connected series aiding and 35 mH in series opposing. Find L<sub>1</sub>, L<sub>2</sub>, M and K. (7M)

**(OR)**

6. a) Derive the relationship between Flux,MMF and Reluctance. (7M)
- b)A coil is wound uniformly with 400 turns over an iron ring having a mean circumference of 50 cm and a cross section of 0.4 cm<sup>2</sup>. If the coil has resistance of 10Ω and is connected across a 50V DC supply, calculate the m.m.f of the coil, magnetic field strength, magnetic field density,total flux and reluctance of the ring. (7M)

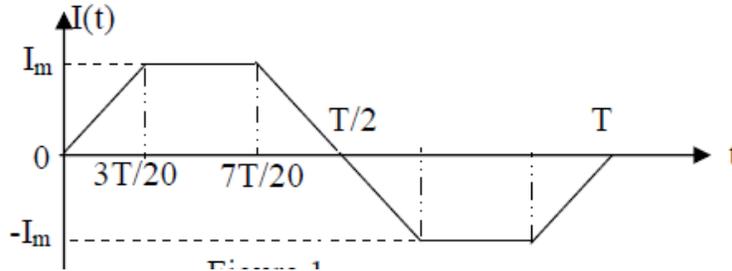
### UNIT-IV

7. a)Define the following: (7M)
- i) Amplitude of an alternating quantity
  - ii) Instantaneous value of an alternating quantity
  - iii) Frequency

b) Show that power consumed in a purely inductive circuit is zero when sinusoidal voltage is applied across it. (7M)

(OR)

8. a) Find the average value, r.m.s value, form factor and peak factor for the wave form shown in figure. (7M)



b) A coil of inductance  $L$  and resistance  $R$  in series with a capacitor is supplied at a constant voltage from a variable frequency source. If the frequency is  $\omega_r$ , find in terms of  $L$ ,  $R$  and  $\omega_r$  the values of those frequencies at which the circuit current would be half as much as that at resonance. Hence or otherwise determine the bandwidth and selectivity of the circuit. (7M)

UNIT-V

9. a) Explain the relationship between line and Phase quantities in delta connected circuits? (7M)

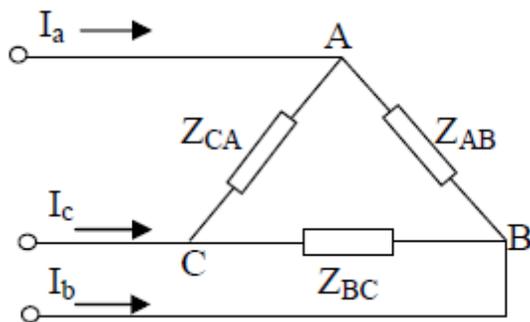
b) A balanced star connected load of  $(4+j3) \Omega$  per phase is connected to a balanced  $3\phi$  400v supply.

The phase current is 12 A. Find a) active power b) reactive power c) Apparent power (7M)

(OR)

10. a) A four-wire star-star circuit has  $V_{an} = 120 \angle 120^\circ$ ,  $V_{bn} = 120 \angle 0^\circ$ ,  $V_{cn} = 120 \angle -120^\circ$  V. If the impedances are  $Z_{an} = 20 \angle 60^\circ$ ,  $Z_{bn} = 30 \angle 0^\circ$  and  $Z_{cn} = 40 \angle 30^\circ \Omega$ , find the current in the neutra line. (7M)

b) For the circuit shown in figure 3, the line voltage is 240 V. Take  $V_{ab}$  as reference and determine following: i) phase currents, ii) line currents, iii) total power absorbed in the load. Also draw Phasor diagram (7M)



$$\begin{aligned} Z_{AB} &= 25 \Omega \\ Z_{BC} &= 12 \angle 60^\circ \Omega \\ Z_{CA} &= 16 \angle -30^\circ \Omega \end{aligned}$$

[B17 EE 1201]

[B17 EE 1202]  
**I B. Tech II Semester (R 17) Regular Examinations**  
**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**  
**(Mechanical Engineering)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

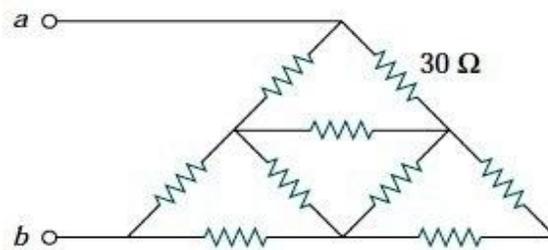
Answer **ONE Question** from **EACH UNIT**.  
All questions carry equal marks.

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**UNIT-I**

1. (a) State and explain Kirchhoff's Laws with example. [7M]

(b) Find the equivalent resistance  $R_{ab}$  for the circuit shown below. All the resistor values are  $30\Omega$ . [7M]



**OR**

2. (a) Define Dynamically Induced E.M.F and derive expression for it. [7M]

(b) A coil having an inductance  $60\text{mH}$  is carrying a current of  $60\text{A}$ . Calculate the Self-induced EMF in the coil. When the current in the coil reversed in  $30\text{milliseconds}$ . [7M]

**UNIT-II**

3. (a) Derive the EMF equation of DC generator [7M]

(b) A shunt generator supplies a load of  $7.5\text{KW}$  at  $200\text{V}$ , Calculate the generated emf if armature resistance is  $0.6\Omega$  and field resistance of  $80\Omega$ . [7M]

**OR**

4. (a) Derive the torque equation of the DC motor. [7M]

(b) An 8-pole, wave-connected armature has  $600$  conductors and is driven at  $625$  rev/min. If the flux per pole is  $20\text{mWb}$ , determine the generated E.M.F. [7M]

### UNIT-III

5. (a) Derive the EMF equation of a single phase transformer. [7M]  
(b) A 200 KVA rated transformer has a full-load copper loss of 1.5 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load & half load for 0.85 power factor. [7M]

#### OR

6. (a) Explain the operation of Transformer under NO-LOAD with phasor diagram. [7M]  
(b) An ideal 25KVA Transformer has 500 turns on primary and 40 turns on the secondary winding. The primary winding is connected to 3000 V, 50Hz supply. Calculate (i) Primary and secondary currents (ii) Secondary EMF (iii) Maximum flux. [7M]

### UNIT-IV

7. (a) Draw and explain the slip-Torque Characteristics of Three phase Induction motor. [7M]  
(b) The frequency of the supply to the stator of a 6-pole induction motor is 50 Hz and the rotor frequency is 2 Hz. Determine (i) the slip, and (ii) the rotor speed in r.p.m [7M]

#### OR

8. (a) Derive the EMF equation of Alternator [7M]  
(b) Obtain the Voltage Regulation of Alternator by synchronous impedance method [7M]

### UNIT-V

9. a) Explain the operation of Diode in Forward and reverse bias conditions and draw V-I characteristics. [7M]  
(b) Explain the operation of Zener diode and draw its V-I characteristics [7M]

#### OR

10. (a) Draw the circuit diagram of Bridge rectifier and explain its operation. [7M]  
(b) Explain how the transistor acts as an amplifier. [7M]

[B17 EE 1203]  
**I B. Tech II Semester (R 17) Regular Examinations**  
**ELEMENTS OF ELECTRICAL ENGINEERING**  
**(Electronics and Communication Engineering)**  
**MODEL QUESTION PAPER**

**Time: 3 hours**

**Max. Marks: 70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

1. (a) State and explain Kirchoff's Laws with example. [7M]  
(b) Derive star-delta and delta- star Transformation for Equal resistances [7M]

**(OR)**

2. (a) Define Dynamically Induced E.M.F and derive expression for it. [7 M]  
(b) A coil having an inductance 60mH is carrying a current of 60A. Calculate the Self-induced EMF in the coil. When the current in the coil reversed in 30milliseconds. [7M]

**UNIT-II**

3. (a) Derive the EMF equation of DC generator [7M]  
(b) A series motor drives a load at 1500 r.p.m and takes a current of 20A when the supply voltage is 250V if the total resistance of the motor is 1.5 ohms and the iron, friction and windage losses amount to 400W. Determine the efficiency of the motor. [7M]

**(OR)**

4. (a) Derive the Torque equation of DC motor. [7M]  
(b) A shunt generator supplies a load of 7.5KW at 200V, Calculate the generated emf if armature resistance is  $0.6\Omega$  and field resistance of  $80\Omega$ . [7M]

**UNIT-III**

5. (a) Explain the operation of Transformer under NO-LOAD with phasor diagram. [7M]  
(b) An ideal 25KVA Transformer has 500 turns on primary and 40 turns on the secondary winding. The primary winding is connected to 3000 V, 50Hz supply. Calculate (i) Primary and secondary currents (ii) Secondary EMF (iii) Maximum flux. [7M]

**(OR)**

6. (a) Derive the EMF equation of a single phase transformer. [7M]

(b) A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core. Neglect leakage drops and no-load primary current [7M]

**UNIT-IV**

- 7 (a) Explain the Slip - Torque Characteristics of Three phase Induction Motor. [7M]  
(b) A 3-Phase Induction Motor is Running at 5% slip. The Output is 36.75KW and Total Mechanical losses are 1.5KW. Estimate the copper losses in the rotor. If the stator losses are 4KW, estimate the efficiency of the Motor. [7M]

**(OR)**

8. (a) Define Slip and Rotor Frequency in Detail. [7M]  
(b) The Power Input to 3- $\phi$  Induction motor is 55Kw. Total stator losses Equal to 2.2Kw. Find (i) Rotor copper loss (ii) Mechanical Power developed if the motor is running at a speed of 720rpm at 50Hz supply with 4poles. [7M]

**UNIT-V**

9. (a) Derive the EMF equation of Alternator [7M]  
(b) Obtain the Voltage Regulation of Alternator by SYNCHRONOUS IMPEDENCE METHOD. [7M]

**(OR)**

10. (a) Explain the operation of PMMC with neat sketches [7M]  
(b) Explain Deflecting, controlling and damping Torques with neat sketches [7M]

**[B17 EE 1203]**

**[B17 BS 2101]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**MATHEMATICS-IV**  
**Common to CE,ECE,EEE & ME**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Prove that the function defined by 7M

$$f(z) = \frac{(1+i)x^3 - (1-i)y^3}{x^2 + y^2} \quad (z \neq 0) \text{ and } f(0) = 0 \text{ is continuous and the Cauchy-}$$

Riemann equations are satisfied at the origin, yet  $f'(0)$  do not exist.

- (b). Find the complex potential  $w$  and velocity potential  $\phi$  when its stream 7M

$$\text{function is } \psi = \tan^{-1}\left(\frac{y}{x}\right)$$

(OR)

2. (a). If  $f(z)$  is a regular function of  $z$ , prove that 7M

$$\left( \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$$

- (b). Find the bi-linear transformation which maps the points  $Z = 1, -1, \infty$  onto the 7M  
points  $w = 1+i, 1-i, 1$ . Hence find (a) the critical points and (b) the invariant  
points of this transformation.

**UNIT-II**

3. (a). Solve  $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$ , given that  $u = 3e^{-y} - e^{-5y}$  when  $x=0$  7M

- (b). A tightly stretched string with fixed end points  $x = 0$  and  $x = l$  is initially at rest 7M  
in its equilibrium position. If it is vibrating by giving to each of its points a  
velocity  $\lambda x(l-x)$ , find the displacement of the string at any distance  $x$  from  
one end at any time  $t$ .

(OR)

4. (a). A homogeneous rod of conducting material of length 100 cm has its ends kept 7M  
at zero temperature and the temperature initially is

$$u(x,0) = x, \quad 0 \leq x \leq 50$$

$$= 100 - x, \quad 50 \leq x \leq 100$$

Find the temperature  $u(x,t)$  at any time.

- (b). Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  for  $0 < x < \pi, 0 < y < \pi$  with conditions given  $u(x,\pi) = 0,$  7M

$$u(0,y) = 0, \quad u(\pi,y) = 0, \quad u(x,0) = \sin^2 x.$$

**UNIT-III**

5. (a). Form the difference equation generated by  $y_n = (A + Bn)3^n$  7M  
(b). Solve the difference equation  $y_{n+2} + y_{n+1} - 56y_n = 2^n(n^2 - 3)$  7M

(OR)

6. (a). If  $Z(u_n) = \frac{z}{z-1} + \frac{z}{z^2+1}$  find the Z-transform of  $u_{n+2}$  7M  
(b). Using Z-transforms, solve  $u_{n+2} - 2u_{n+1} + u_n = 3n + 5$ . 7M

**UNIT-IV**

7. (a). Twenty identical coins each with probability  $P$  of showing heads are tossed. The Probability of heads showing on 10 coins is same as that of heads showing on 11 coins. Find  $P$ . 7M  
(b).  $X$  is a normal variate with mean 30 and standard deviation 5. Find the probability that (i)  $26 \leq X \leq 40$  (ii)  $X \geq 45$  (iii)  $|X - 30| > 5$  7M

(OR)

8. (a). Derive moment generating function of Poisson distribution. 7M  
(b). In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 7M

**UNIT-V**

9. (a). A sample of height of 6400 soldiers has a mean of 67.85 inches and a standard deviation of 2.56 inches while a simple sample of heights of 1600 sailors has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate that the sailors are on the average taller than soldiers? 7M  
(b). A die is tossed 960 times and it falls with 5 upwards 184 times. Is the die biased? 7M

(OR)

10. (a). A sample of 10 measurements of the diameter of a sphere gave a mean of 12 cm and a Standard deviation of 0.15 cm. Find 95% confidence limits for the actual diameter. 7M

- (b). The number of accidents in a street during a particular week is given below: 7M

Days:	Mon	Tue	Wed	Thu	Fri	Sat
No. of	5	4	3	7	6	5

accidents:

Test the hypothesis that the number of accidents does not depend on the day of the week.

**[B17 BS 2101]**

**[B17 ME 2101]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**STRENGTH OF MATERIALS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a) Draw a typical stress-strain curve for mild steel and explain clearly the salient points. **7M**
  - (b) A steel rod of 3 cm diameter is enclosed centrally in a hollow copper tube of external diameter 5 cm and internal diameter 4 cm. The composite bar is then subjected to an axial pull of 45,000 N. If the length of each bar is equal to 15 cm, determine the stresses in the rod and tube and load carried by each bar. Take  $E_s = 2.1 \times 10^5 \text{ N/mm}^2$  and  $E_c = 1.1 \times 10^5 \text{ N/mm}^2$ . **7M**
- (OR)**
2. (a) Define principal planes and principal stresses and also derive the expressions for them. Draw Mohr's circle to get the same. **7M**
  - (b) Direct stresses of  $40 \text{ N/mm}^2$  (tensile) and compressive stress  $25 \text{ N/mm}^2$  are applied to an elastic material at a certain point on planes at right angles to one another. The maximum principal stress in the material is limited to  $50 \text{ N/mm}^2$  (tensile). To what shearing stress may be the material is subjected on the given planes and what will then be the maximum shear stress at the point? **7M**

**UNIT-II**

3. (a) Name and sketch different types of loads acting on beams **5M**
- (b) Draw the bending moment and shear force diagram for the beam loaded as shown in Fig.1, Mark the values at the salient points. **9M**

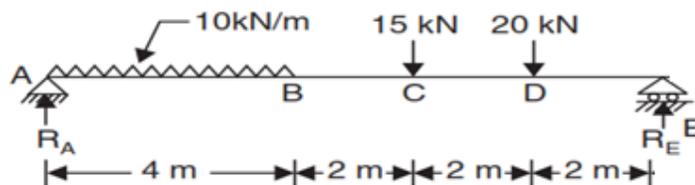


Fig.-1

**(OR)**

4. (a) Derive a relationship between loading, shear force and bending moment. **5M**
- (b) Draw BM and SF diagrams for the beam shown in Fig.2, indicating the values at all salient points **9M**

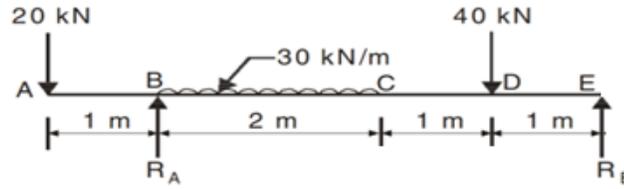


Fig.-2

**UNIT-III**

5. (a) Derive an expression for bending stress at a layer in a beam stating the assumption made. **7M**  
 (b) Calculate the maximum stress induced in a cast iron pipe of external diameter 40mm, of internal diameter 25mm and length 4.5m. When the pipe is supported at its ends and carries a point load of 90N at its centre. **7M**

(OR)

6. (a) Prove that the maximum shear stress in a circular section of is  $4/3$  times the average shear stress. **7M**  
 (b) A beam has cross-section as shown in Fig.3. If the shear force acting on this is 25 KN, draw the shear stress distribution diagram across the depth. **7M**

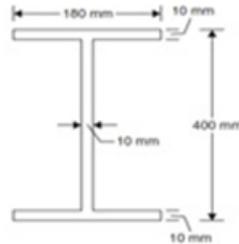


Fig.-3

**UNIT-IV**

7. (a) Define three Elastic constants and derive relationship between them. **7M**  
 (b) Find an expression for the strain energy stored in a body when the load is applied with an impact. **7M**

(OR)

8. (a) Compare the weights of equal lengths of hollow and solid circular shafts to transmit a given torque for the same maximum shear stress, if the inside diameter of the hollow circular shaft is  $2/3$  of the outside diameter **7M**  
 (b) A shaft has to transmit a torque of 15 KN-m. Compare the weights of the shafts per unit length when it has a solid circular section when it is a hollow circular section with an inner diameter that is 80 percent of the outer diameter. Assume that the allowable shear stress is 70MPa. **7M**

**UNIT-V**

9. (a) Derive expressions for the hoop and longitudinal stresses in thin cylinder subjected to internal pressure. **7M**

- (b) A thin cylinder 5cm internal diameter and 1mm wall thick is closed at ends, and is subjected to an internal pressure of  $1 \text{ N/mm}^2$ . If the cylinder is subjected to a torque of  $50,000 \text{ N-mm}$ . Find hoop stress, longitudinal stress, maximum and minimum principal stresses, maximum shear stress. **7M**

(OR)

10. (a) State the assumptions made in deriving Lamé's equations. **4M**
- (b) A thick cylinder with internal radius of 8cm and external radius of 16cm is subjected to an internal fluid pressure of  $80 \text{ MPa}$ . Draw the variation of radial and hoop stresses in the cylinder wall. Also determine the maximum shear stress in the cylinder wall. **10M**

[B17 ME 2101]

**[B17 ME 2102]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**THERMODYNAMICS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain the terms macroscopic point of view, reversible process and thermodynamic work 7M  
(b). Discuss the terms Quasi – static Process, work , path function 7M  
(OR)
2. (a). Define the terms heat, Property, point function 7M  
(b). Explain the terms Concept of equality of temperatures and Thermodynamic Equilibrium 7M

**UNIT-II**

3. (a). Derive the following for adiabatic process 7M  
(i) P-V-T Relationships (ii) work done  
(b). A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which  $PV = \text{constant}$  The initial density of air is  $1.16 \text{ kg/m}^3$  find the work done by the piston to compress the air. 7M  
(OR)
4. (a). Write and explain vanderwaals equation of state. 7M  
(b). Air enters an insulated diffuser operating at steady state at a pressure of 70 KPa, a temperature of 330 K and a velocity of 200 m/sec at the exit the pressure is 1 bar. The exit flow area is 20% greater than inlet flow area ,potential energy effects neglected Using  $C_p = 1.0068 \text{ kJ/kg K}$  determine at the exit (i) temperature (ii) velocity 7M

**UNIT-III**

5. (a). State the statements of second law of thermodynamics. 7M  
(b). Two Carnot engines work in series between the sources and sink temperatures of 550 K and 350 K. If the both engines develop equal power, determine the intermediate temperature between them. 7M  
(OR)
6. (a). Define entropy and Explain Entropy-a property of a system. 7M  
(b). 300kj/s of heat is supplied at a constant fixed temperature of  $290^{\circ}\text{C}$  to a heat engine .The heat rejection takes place at  $8.5^{\circ}\text{C}$ .The following result were obtained (i) 215 kJ/s are rejected.(ii)150 kJ/s are rejected (iii) 75 kJ/s are rejected. Classify which of the result report a reversible cycle or irreversible cycle or impossible 7M

#### UNIT-IV

7. (a). Derive an expression for the air standard thermal efficiency of a diesel cycle with help of P-V and T-S diagram 7M  
(b). An air standard dual cycle has a compression ratio is 10; the pressure and temperature at beginning of compression are 1 bar and  $27^{\circ}\text{C}$ . The maximum pressure reached is 42 bar and maximum temperature is  $1500^{\circ}\text{C}$ . Determine (i) the temperature at end of constant volume heat addition (ii) cut-off ratio (iii) cycle efficiency (iv) work done per kg of air assume  $C_p=1.004 \text{ kJ/kg-K}$ ,  $C_v=0.717 \text{ kJ/kg-K}$  for air 7M
- (OR)
8. (a). Sketch P-V and T-S diagrams for Comparison of Otto, diesel and dual cycles at same compression ratio and heat addition. 7M  
(b). Derive an expression for the air standard thermal efficiency of a dual cycle with help of P-V and T-S diagram. 7M

#### UNIT-V

9. (a). Define available energy and unavailable energy. 7M  
(b). A System at 500 K receives 7200 kJ/min from a source at 1000 K. The temperature of atmosphere is 300 K assuming that the temperatures of system and source remain constant during heat transfer find out: (i) the entropy produces during heat transfer (ii) the decrease in available energy after heat transfer 7M
- (OR)
10. (a). Discuss the Helmholtz function and Gibbs function. 7M  
(b). Derive the Maxwell relation and explain their significance. 7M

[B17 ME 2102]

**[B17 ME 2103]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**MANUFACTURING PROCESS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

- |      |      |   |    |
|------|------|---|----|
| 1.   | (a). | List out various pattern allowances. Discuss any four         | 7M |
|      | (b). | Explain various properties of moulding sand.                  | 7M |
| (OR) |      |   |    |
| 2.   | (a). | With a neat sketch explain the working of cupola furnace.     | 7M |
|      | (b). | Explain with a neat sketch various elements of gating system. | 7M |

**UNIT-II**

- |      |      |   |    |
|------|------|---|----|
| 3.   | (a). | Enumerate with neat sketches about various steps involved in making investment casting. | 7M |
|      | (b). | With a neat sketch explain centrifugal casting process.                                 | 7M |
| (OR) |      |   |    |
| 4.   | (a). | Explain various steps involved in shell moulding process with sketches.                 | 7M |
|      | (b). | Explain with a neat sketch hot chamber die casting process.                             | 7M |

**UNIT-III**

- |      |      |  |    |
|------|------|--|----|
| 5.   | (a). | Describe the principle of rolling. Write the various kinds of rolling mills along with their applications. | 7M |
|      | (b). | What is extrusion? Explain the process with the help of a neat sketch.                                     | 7M |
| (OR) |      |  |    |
| 6.   | (a). | Explain the process of wire drawing with a neat sketch.  | 7M |
|      | (b). | Explain the following: (i). Embossing (ii). Coining (iii). Stretch forming.                                | 7M |

**UNIT-IV**

- |      |      |   |    |
|------|------|---|----|
| 7.   | (a). | What is forging? Explain various forging operations with the help of neat sketches. | 7M |
|      | (b). | Explain with a neat sketch press and machine forging processes.                     | 7M |
| (OR) |      |   |    |
| 8.   | (a). | Explain different steps involved in impression die forging                          | 7M |
|      | (b). | Explain with a neat sketch the process of high energy rate forming.                 | 7M |

**UNIT-V**

- |      |      |  |    |
|------|------|--|----|
| 9.   | (a). | What is the principle of resistance welding? Explain any two resistance welding methods. | 7M |
|      | (b). | Differentiate TIG welding and MIG welding.   | 7M |
| (OR) |      |  |    |
| 10.  | (a). | What is the principle of gas welding? Explain various flames obtained in gas welding.    | 7M |
|      | (b). | Explain the following: (i) Friction welding; (ii) Explosive welding.                     | 7M |

**[B17 ME 2103]**

**[B17 ME 2104]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**METALLURGY & MATERIALS SCIENCE**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Discuss Point defects in crystals with neat sketches? 7M  
(b). Show that the ratio of  $c/a$  ratio for an ideal H.C.P structure is 1.633 7M

**(OR)**

2. (a). Write the steps in determining the miller indices of plane? 7M  
(b). Explain the concept of Slip and Twinning 7M

**UNIT-II**

3. (a). Draw a neat sketch of iron-carbon diagram and explain it. 7M  
(b). What is a solid solution? Differentiate substitution and interstitial solid solution with examples. 7M

**(OR)**

4. (a). What is a phase diagram? And discuss the methods of construction of phase diagrams. 7M  
(b). Explain the Annealing and Normalizing process. 7M

**UNIT-III**

5. (a). Draw isothermal transformation curves for a eutectoid steel and explain it. 7M  
(b). Explain about Carburizing and Nitriding process. 7M

**(OR)**

6. (a). Explain CCT diagram for eutectoid steels. 7M  
(b). Discuss about Flame Hardening and Precipitation Hardening process. 7M

**UNIT-IV**

7. (a). Explain in detail about copper and its alloys. 7M  
(b). Explain different types of cast irons and its applications 7M

**(OR)**

8. (a). Discuss the composition and application of high manganese steels. 7M  
(b). Determine various effects of alloying elements in steels. 7M

**UNIT-V**

9. (a). What is a composite material? Discuss briefly various reinforcements in composite materials. 7M  
(b). Mention advantages, limitations and applications of particle- reinforced composites. 7M

**(OR)**

- 10. (a).** List out various advantages and limitations of Powder Metallurgy. **7M**
- (b).** Discuss the basic steps involved in Powder Metallurgy. **7M**

**[B17 ME 2104]**

**[B17 ME 2105]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**ADVANCED ENGINEERING DRAWING**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

Questions from Unit-V should be answered on Answer booklet

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**UNIT-I**

1. Draw the projections of a cube of 25mm long edges resting on the HP on one of its corners with a solid diagonal perpendicular to VP. 14M  
(OR)
2. A square pyramid base 38mm side and axis 50mm long is freely suspended from one of its corners of its base. Draw the projections when the axis as a vertical plane makes an angle  $45^{\circ}$  with the VP. 14M

**UNIT-II**

3. A pentagonal pyramid (base side of 30 mm and axis 60 mm long) is lying on one of its triangular faces on the HP with axis parallel to VP. A vertical section plane, whose HT bisects the top view of the axis and makes an angle of  $30^{\circ}$  with the reference line, cuts the pyramid removing its top part. Draw the top view, sectional front view and true shape of the section. 14M  
(OR)
4. A pentagonal prism of base 28 mm side and height 65 mm has an edge of its base on the HP and the axis parallel to VP and inclined at  $60^{\circ}$  to HP. A section plane having its VT inclined at  $60^{\circ}$  to XY and passing through the highest corner cuts the prism. Draw the sectional top view and true shape of section. 14M

**UNIT-III**

5. A lamp shade is formed by cutting a cone of base 144 mm diameter and 174 mm height by a horizontal plane at a distance of 72 mm from the apex and another plane is inclined at  $30^{\circ}$  to HP, passing through one extremity of the base. Draw the development of the shade. 14M  
(OR)
6. A hexagonal pyramid, base 30 mm side and axis 75 mm long, resting on its base on the ground with two of its edges parallel to the VP. Is cut by two section planes, both perpendicular to the VP. The horizontal section plane cuts the axis at a point 35 mm from the apex. The other plane which makes an angle of  $45^{\circ}$  with the HP also intersects the axis at the same point. Draw the development of the surface of the remaining part of the pyramid. 14M

#### UNIT-IV

7. A cylinder of 75 mm diameter and 125 mm height stands on its base on the ground. It is penetrated centrally by a cylinder, 50 mm diameter and 125 mm long, whose axis parallel to VP and is, inclined at  $30^0$  to the HP. Draw the projection showing curves of intersection. 14M

(OR)

8. A vertical square prism, base 50 mm side is completely penetrated by a horizontal square prism, base 35 mm side so that their axes are 6 mm apart. The axis of the horizontal prism is parallel to the VP, while the faces of both prisms are equally inclined to the VP. Draw the projections of the prisms showing line of intersection. Assume axes height as 80 mm for both prisms. 14M

#### UNIT-V

9. (a) What are the reasons for implementing CAD systems and write its advantages. 7M  
(b) Explain the draw commands used in Auto CAD. 7M
- (OR)
10. (a) What is the difference between Copy and Move? 7M  
(b) Explain in brief different types of Geometric modeling. 7M

[B17 ME 2105]

**[B17 ME 2201]**  
**II B. Tech II Semester (R 17) Regular Examinations**  
**ADVANCED STRENGTH OF MATERIALS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Derive the relation between curvature, slope and deflection of a beam subjected to lateral loading. **7M**
- (b). A simply supported beam of span ' $l$ ' and of uniform flexural rigidity ' $EI$ ' carries a UDL of intensity ' $w$ ' covering exactly the left half of the span. Find: **7M**
- (i) equation of elastic curve.
  - (ii) slope at left support.
  - (iii) maximum deflection.
- (OR)**
2. (a) State Mohr's moment area theorems. **4M**
- (b) Use moment area method to determine end slopes and central deflection of a simply supported beam of length ' $l$ ' loaded with two equal point loads, each of magnitude ' $W$ ' acting at distances of ' $l/3$ ' from each support. Take the flexural rigidity for the beam as  $EI$ . **10M**

**UNIT-II**

3. (a). Derive the relations between fixing moments of a fixed beam. **7M**
- (b). A beam of span 4 m fixed at A and B carries a UDL of 1500 N/m. The support B sinks by 1mm. Find the fixed end moments and draw the BMD for the beam. **7M**  
Take  $E = 2 \times 10^5 \text{ N/mm}^2$ ,  $I = 8000 \text{ cm}^4$ .
- (OR)**
4. Draw BMD and SFD for a fixed beam of length 4 m and subjected to a UDL of 3 KN/m run throughout its length and a concentrated load of 10 KN at its mid span. Locate the points of contra flexure, if any. **14M**

**UNIT-III**

5. (a). What are the advantages, disadvantages and applications of continuous beams? **7M**
- (b). Derive Clapeyron's theorem of 3 moments applied to a continuous beam of uniform cross section. **7M**
- (OR)**
6. A continuous beam ABCD covers three spans,  $AB = 6 \text{ m}$ ,  $BC = 12 \text{ m}$ ,  $CD = 4 \text{ m}$ . It carries UDLs of 2 KN, 1 KN and 3 KN per meter run on AB, BC and CD respectively. If the beam is of same cross section throughout, find the bending moments at the supports B and C and the pressure on each support. Plot the BMD and SFD. **14M**

**UNIT-IV**

7. (a). Derive Euler's buckling load formula for a column having both ends fixed. **7M**  
 (b). Determine the crippling load for a T –section of dimensions 10 cm X 10 cm X 2 cm and length 5 m, when it is used as a strut with both ends fixed. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ . **7M**

(OR)

8. (a). Derive Secant formula applicable to a column subjected to eccentric load. **7M**  
 (b). A hollow cylindrical C.I. column is 4 m long with both ends fixed. Determine the internal diameter of the column if it has to carry a safe load of 250 KN with a factor of safety of 5. Take the ID as 0.8 times the E.D,  $\sigma_c = 550 \text{ N / mm}^2$  and  $\alpha = 1/1600$  in Rankine's formula **7M**

**UNIT-V**

9. Obtain an expression for circumferential stress induced in a curved bar subjected to uniform bending moment. **14M**

(OR)

10. (a). Obtain an expression for modified area of cross section ( $h^2$ ) of a curved bar of trapezoidal cross section. **4M**  
 (b). Find maximum and minimum stresses at the most stressed section of the frame shown in Figure 1. **10M**

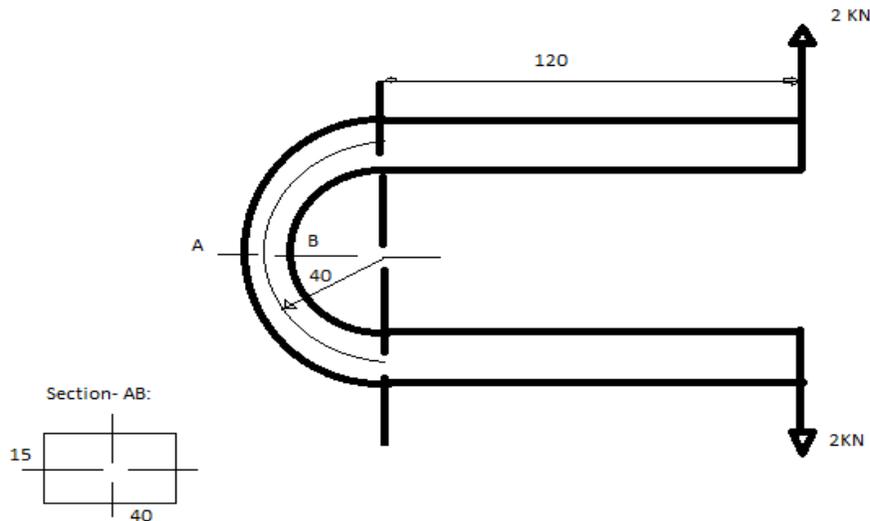


Figure 1

[B17 ME 2201]

**[B17 ME 2202]**  
**II B. Tech II Semester (R 17) Regular Examinations**  
**THERMAL ENGINEERING**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). What is meant by saturation pressure and saturation temperature? **7M**  
(b). Two boilers one with super heater and other without super heater are delivering equal quantities of steam into a common main. The pressure in the boilers and main is 20bar. The temperature of steam from a boiler with a super heater is 350<sup>0</sup>C temperature of the steam in the main is 250<sup>0</sup>C. Determine the quality of steam supplied by other boiler. Take  $C_{ps}=2.25$  kJ/kg-k . **7M**
- (OR)
2. (a). Explain the working principle of Separating and Throttling Calorimeter with neat sketch and determine dryness fraction. **7M**  
(b). Explain the working principle of tank or bucket Calorimeter with neat sketch and determine dryness fraction. **7M**

**UNIT-II**

3. (a). Draw h-S and T-S diagrams for basic Rankine cycle. **7M**  
(b). A steam power plant operates on the ideal reheat Rankine cycle utilizing steam which leaves the boiler and enters the turbine at 4 MPa,400<sup>0</sup>C After expansion in the turbine to 400kPa.The steam is reheated to 400<sup>0</sup>CThen expanded in the low-pressure turbine to 10 KPa. Determine the cycle efficiency and work ratio. **7M**
- (OR)
4. (a). Consider a regenerative cycle using steam as the working fluid steam leaves the boiler and enters the turbine at 4 MPa and 400<sup>0</sup>C. After expansion to 400 kPa some amount of steam is extracted from the turbine for the purpose of heating the feed water in an open feed water heater. The pressure in the feed water heater is 10 kPa and the water is leaving the feed water at 400 kPa is saturated liquid. The non extracted steam expands to 10 kPa. Determine the thermal efficiency, work ratio and specific steam consumption. **7M**  
(b). Explain the binary vapour power cycle with its layout and derive the expression for thermal efficiency. **7M**

### UNIT-III

5. (a). Derive the relation between area velocity and pressure in a flow through a nozzle. **7M**
- (b). In a steam nozzle, the steam expands from a pressure of 4 bar to 1 bar from inlet to the exit .The initial velocity is 60 m/s and the initial temp is 200° C. Determine the exit velocity a) by neglecting the inlet velocity (b) without neglecting the inlet velocity (c) when the nozzle efficiency is 92 %. **7M**

(OR)

6. (a). Derive the relation between area velocity and pressure in a flow through a nozzle. **7M**
- (b). A de-laval type impulse turbine is to develop 150 kW with a probable consumption of 7.5 kg of steam per kW-hr with initial pressure being 12 bar and the exhaust 0.15 bar. Taking diameter at the throat of each nozzle as 6 mm. Find the number of nozzles required. Assuming that 10 % of the total heat drop is lost in diverging part of the nozzle; find the diameter at the exit of the nozzle and the quality of the steam which is to be fully expanded as it leaves the nozzle. **7M**

### UNIT-IV

7. (a). Derive the condition for optimum blade speed ratio for a single stage impulse turbine and find the maximum blade (diagram) efficiency. **7M**
- (b). A single stage Impulse Turbine is supplied with steam at 5 bar and 200°C, at the rate of 50 kg/ min. It expands in to a condenser at a pressure of 0.2 bar. The blade speed is 400m/s. The nozzles are inclined at an angle of 20° to the plane of the wheel; the outlet blade angle is 30°. Neglecting friction losses, determine the power developed, blade efficiency and stage efficiency. **7M**

(OR)

8. (a). Mention the classification of turbines. What are the methods to reduce the rotor speed of an impulse turbine with neat sketch? **7M**
- (b). A velocity compounded impulse turbine has two rows of moving blades with a fixed row of guide blades between them. The steam leaves the nozzle at 900 m/s in a direction at 18° to the plane of rotation. The blade speed is 150 m/s and the blade angles for first moving blade 24°, fixed blade 26°, and second moving blade 30° . Friction factor is 0.9 for all rows. Determine the thrust and power developed for the steam supply of 1.25 kg/s. **7M**

### UNIT-V

9. (a). Mention the classification and uses of steam condensers with neat sketches. **7M**

- (b). A turbine develops 2 MW and uses 11500 kg of steam per hour, the steam being supplied at 20 bar with temperature of 300°C. The exhaust steam is condensed at vacuum of 670 mm of Hg (Barometer 750 mm of Hg) and the condensate leaves at 43.8°C. The rise in the temperature of condensing circulating water is 19.7°C. Calculate 1) The percentage heat thrown in cooling water 2) the mass of cooling water required per kW-Hr and 3) overall thermal efficiency. **7M**

**(OR)**

10. (a). Write a short note on different types of boilers and their applications. **7M**  
(b). Explain the working of Babcock and Wilcox boiler with help of neat sketch **7M**

**[B17 ME 2202]**

**[B17 ME 2203]**  
**II B. Tech II Semester (R 17) Regular Examinations**  
**METAL CUTTING & MACHINE TOOLS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain the different types of chips and their effects on machining 7M  
(b). A steel tube 40 mm outside diameter is turned on a lathe. The following data was obtained: Rake angle =  $22^\circ$ ; Cutting speed = 18m/min; Feed = 0.2 mm/rev; Cutting force =  $180 \text{ kgf} \times 9.81 \text{ N}$ ; Feed force =  $60 \text{ kgf} \times 9.81 \text{ N}$ ; Length of continuous chip in one direction = 50 mm. Determine: (i) Chip thickness ratio; (ii) chip thickness; (iii) Shear plane angle; (iv) velocity of chip along tool face; (v) coefficient of friction. 7M

(OR)

2. (a). Draw the neat sketch of single point cutting tool and show the different parts and angles on it. 7M  
(b). While machining a mild steel bar with HSS tool the cutting speed is 32 m/min, tool life is 50 min, if cutting speed is increase by 50%, how tool is affected? Take  $n = 0.2$ . 7M

**UNIT-II**

3. (a). Name different taper turning methods. Explain any two methods. 7M  
(b). What are the differences between capstan and turret lathe? 7M
- (OR)
4. (a). Explain any one quick return mechanism used in shaper. 7M  
(b). Explain different types of planning machines. 7M

**UNIT-III**

5. (a). Explain the construction and working principle of a radial drilling machine. 7M  
(b). What is broaching? Explain the nomenclature of Pull broach. 7M

(OR)

6. (a). Describe the working of column and knee type milling machine. 7M  
(b). Explain with a neat sketch the working of universal dividing head. 7M

**UNIT-IV**

7. (a). Describe the working of cylindrical grinding machine. 7M  
(b). Describe the galzing, loading and dressing of grinding wheels. 7M

(OR)

8. (a). Differentiate between lapping and honing. 7M  
(b). Explain the following: 7M  
(i) Grit, Grade and Structure of grinding wheel & (ii) Buffing

**UNIT-V**

9. (a). Explain the principle of operation of AJM. What are its applications? 7M  
(b). What is EDM? Sketch and explain the process. 7M

(OR)

10. Explain the following: 14M  
(i) LBM 7 (ii) ECM

**[B17 ME 2203]**

**[B17 ME 2204]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**FLUID MECHANICS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Define Hydrostatic law and Derive expression for pressure variation in a static fluid. 7M
- (b). The dynamic viscosity of an oil which is used for lubrication between shaft and sleeve is 6 poise. The shaft is of diameter 0.4m and rotates at 190rpm calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of the oil film on is 1.5mm. 7M

(OR)

2. (a). Derive an equation for total pressure and centre of pressure on vertical plane surface. 7M
- (b). A uniform body of size 3m long, 2m wide, in deep floats in water. What is the weight of the body. Also determine the meta centric height if depth of immersion is 0.8. 7M

**UNIT-II**

3. (a). Derive 3D- continuity equation in Cartesian co-ordinate system. 7M
- (b). If for two dimensional potential flow the velocity potential is given by  $\phi = x(2y - 1)$ . Determine the magnitude of the resultant velocity, Direction of the resultant velocity also determine the value of stream function  $\Psi$  at (4,5). 7M

(OR)

4. (a). Derive Bernoulli's Equation from Euler's Equation for incompressible flow. 7M
- (b). A horizontal venturimeter of inlet diameter 20cm and external diameter 10cm is used to measure the flow of oil specific gravity 0.8 the discharge of oil through venturimeter is 60 lit./sec. Find the reading of mercury differential manometer take  $C_v=0.98$ . 7M

**UNIT-III**

5. (a). Derive Darcy Weis-bach equation for head loss due to friction in pipes. 7M
- (b). A pipe of 300mm diameter has maximum velocity of flow 2 m/s and flow in the pipe is laminar. Find 7M
  - i) Average velocity and radius at which it occurs.
  - ii) The velocity at 50mm from the wall of the pipe.

(OR)

6. (a). Write a short notes on model laws. 7M  
(b). The efficiency  $\eta$  of a fan depends on density  $\rho$ , dynamic viscosity  $\mu$  of the fluid, angular velocity  $\omega$ , diameter  $D$  of the rotor and the discharge  $Q$ . Express  $\eta$  in terms of dimension less parameters. 7M

**UNIT-IV**

7. (a). Derive an expression for Displacement thickness and momentum thickness. 7M  
(b). Determine the displacement thickness, momentum thickness and energy thickness for velocity distribution in the boundary layer is given by  $\frac{u}{U} = \frac{y}{\delta}$  7M

(OR)

8. (a). Derive an Equation for drag force along the flat plate due to boundary layer formation. 7M  
(b). A plate 450mm  $\times$  150mm has been placed longitudinally in a stream of crude oil (Specific gravity 0.925) and kinematic viscosity 0.9 stokes which flows with a velocity of 6 m/s. Calculate 7M  
i) The frictional drag on the plate  
ii) The thickness of the boundary layer at the trailing edge.

**UNIT-V**

9. (a). Derive an expression for velocity of sound for an adiabatic Process 7M  
(b). An aeroplane is flying at a height of 14km where temperature is  $-45^{\circ}\text{C}$  the speed of the plane is corresponding to  $M=2$  find the speed of the plane if  $R=287 \text{ J/kgK}$  and  $\gamma=1.4$ . 7M

(OR)

10. (a). What are stagnation properties? Derive the expression for stagnation pressure in compressible flow. 7M  
(b). Explain with neat sketches, propagation of pressure waves by an object moving in compressible fluid. 7M

**[B17 ME 2204]**

**[B17 ME 2205]**  
**II B. Tech II Semester (R 17) Regular Examinations**  
**MECHANICAL ENGINEERING DRAWING**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

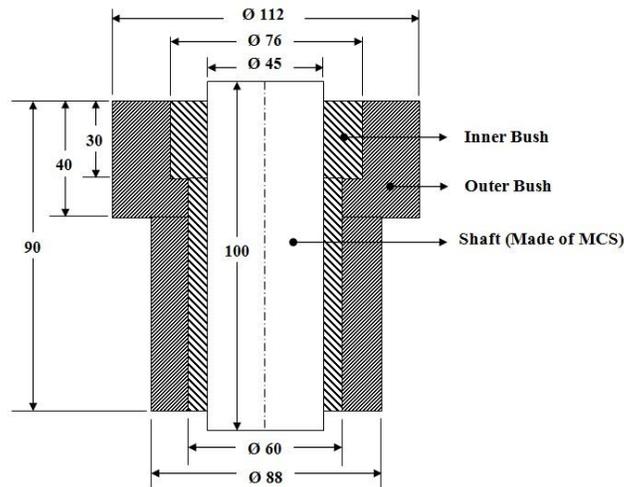
**TIME: 3Hrs.**

**Max. Marks:70**

Answer all questions  
Tolerance Tables are permitted  
Assume any missing data wherever it is necessary

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1. Answer the following questions [20 M]
  - (a) Profiles of ACME and BUTTRESS thread for 40mm pitch. [5 M]
  - (b) Double riveted zigzag lap joint which is having 20 mm diameter rivet. [5 M]
  - (c) Show the conventional representation of the following (i) Cast Iron; (ii) Internal and External Threads; (iii) Leaf spring with eye; (iv) Spur gear; (v) 6 holes on circular pitch. [5 M]
  - (d) Sketch one example with an appropriate tolerance frame showing the geometrical tolerance features for **angularity** and **run-out**. [5 M]
  
2. Indicate the tolerances and allowances for a hole shaft pair shown in bushed bearing assembly designated by  $\text{Ø } 20 \text{ H8 e8}$  and also determine the type of fit. [10 M]
  
3. Two rods of 20 mm diameter each are to be coupled together to enable them to transmit power from one shaft to another shaft such that the axis of two shafts lie in the same line. Suggest the type of coupling to be used to transmit power and draw its half sectional front view and its simple side view. [10 M]
  
4. Prepare the working (or) productions drawing (with necessary tolerances, roughness symbols and tolerance frames) for the shaft assembly shown in Fig.1. [15 M]



**Figure 1 Shaft Assembly (All Dimensions are in mm)**

5. Draw the following views for the simple eccentric assembly shown in Figure 2. [15 M]  
 (i) Half sectional front view; (ii) simple side view

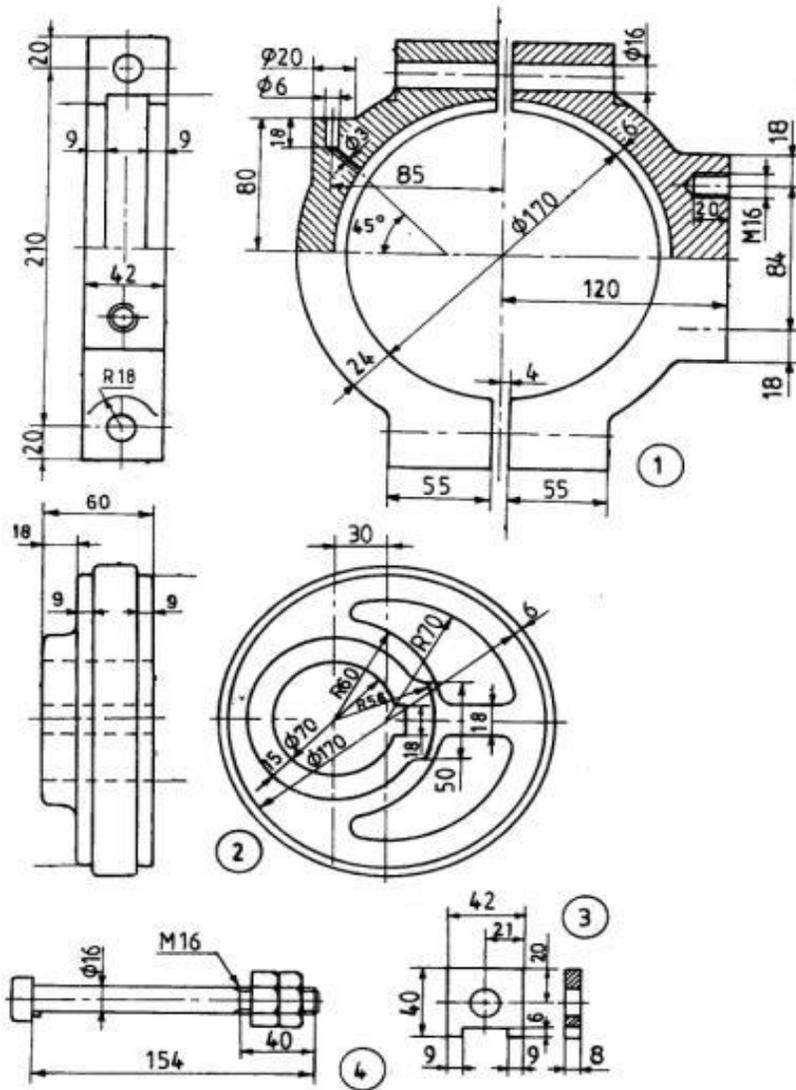


Figure 2. Parts of Simple Eccentric  
 Parts List

Part No.	Name	Material	Qty.
1.	Straps	Cast Iron	2
2.	Sheave	Cast Iron	1
3.	Shim	Brass	1
4.	Bolt & Nuts	Mild Steel	2

[B17 ME 2205]

**[B17 BS 2203]**  
**II B. Tech I Semester (R 17) Regular Examinations**  
**ENGINEERING ECONOMICS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks:70**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. Define Economics. Explain in detail about Micro and Macro Economics 14M  
(OR)
2. What do you understand by Elasticity of demand? How do you measure Elasticity of Demand? 14M

**UNIT-II**

3. Define & classify Cost. Elaborate the Elements of Cost? 14M  
(OR)
4. How do you determine BEP? What are its Assumptions and Applications? 14M

**UNIT-III**

5. What are the features of Perfect Competition? How the price will be determined under Perfect Competition? 14M  
(OR)
6. Why is pricing significant in the context of business? Evaluate any four pricing strategies? 14M

**UNIT-IV**

7. What are features of Mixed Economy? Critically evaluate its Merits & Demerits. 14M  
(OR)
8. What do you mean by Business Cycles? Explain about various theories of Business cycles? 14M

**UNIT-V**

9. Explain about the concept and causes of depreciation. Evaluate the straight line method and diminishing balance methods. 14M  
(OR)
10. Explain about Trading Account, Profit & Loss account and Balance Sheet. 14M

**[B17 BS 2203]**

**[B17ME3101]**  
**III B. Tech I Semester (R17) Regular Examinations**  
**OPERATIONS RESEARCH**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Outline in detail the phases of Operations Research. 7M  
 (b). A mining company owns two different mines that produce a given kind of ore. 7M  
 After the ore is crushed it is graded into 3 classes: high, medium, and low grade ores. The mining company has contracted to provide a smelting company with a minimum of 12 tonnes of high grade, 8 tonnes of medium grade and 24 tonnes of low grade ores/week. The company works for six days in a week and it costs Rs.2000/ day to run the first mine and Rs.1500/ day to run the second mine. In a day's operation the first mine produces 6 tonnes of high grade, 2 tonnes of medium grade and 4 tonnes of low grade ore. The corresponding figures for second mine are 2, 2, and 12. Obtain graphically the no. of days each mine has to be operated in a week to meet the contract most economically.

**(OR)**

2. Maximize:  $Z = -4x_1 - 3x_2$  14M  
 Subject to:  $3x_1 + x_2 = 3$   
 $3x_1 + 4x_2 \geq 4$   
 $x_1 + x_2 \leq 6$   
 and  $x_1, x_2 \geq 0$

**UNIT-II**

3. Solve the following transportation problem. If the coefficients in the matrix indicate profit, maximize the total profit. 14M

To		Destination			Availability
		A	B	C	
From	1	8	6	5	150
	2	6	6	6	150
	3	10	8	4	150
	4	8	6	10	150
Requirement		200	200	200	--

**(OR)**

4. Solve the following TSP. There is no route between cities i and j if the value 14M

for  $C_{ij}$  is not shown.

$C_{12} = 4, C_{13} = 7, C_{14} = 3, C_{23} = 6, C_{24} = 3, C_{34} = 7$ , where  $C_{ij} = C_{ji}$

**UNIT-III**

5. Find the sequence that minimizes the total elapsed time (T) required for completing the following tasks. Each job is processed in the order ACB. Find 'T' also. 14M

JOB	1	2	3	4	5	6	7
M /c -A	12	6	5	11	5	7	6
M /c -B	7	8	9	4	7	8	3
M /c -C	3	4	1	5	2	3	4

(OR)

6. A manufacturing company is required to purchase 4,800 castings per year. The requirement is assumed to be known and fixed. The castings are subject to quantity discounts. The price schedule is as follows:

Quantity	Unit cost (Rs.)
$0 \leq q_1 < 500$	150.00
$500 \leq q_2 < 750$	138.75
$q_3 \geq 750$	131.25

The ordering cost is Rs.750 per order and  $I = 20$  percent per year. Find the optimum purchase quantity per order.

**UNIT-IV**

7. (a). Define payoff matrix and explain the minimax criterion. 7M  
 (b). Solve the following game by graphical method. 7M

	B1	B2	B3	B4
A1	4	-2	3	-1
A2	-1	2	0	1
A3	-2	1	-2	0

(OR)

8. (a). What are the characteristics of queuing processes? Explain 7M  
 (b). Vehicles arrive at a filling station with one pump in a Poisson fashion with an average of 15 vehicles /hour. The time taken for filling the tank is distributed exponentially with an average of 2.4 minutes. Determine: 7M  
 (a) The average number of units in the system.  
 (b) Probability that a vehicle arriving has to wait for servicing.  
 (c) Probability that the number of units in the system is 2.  
 (d) Average time spent by a vehicle in the system.

**UNIT-V**

9. (a). Define critical path. What is the significance of float in network calculations ? 7M  
 Explain the physical meaning of positive, negative and zero floats.  
 (b). Find a small project of 12 activities, the details of which are given below. 7M  
 Draw the network and find earliest occurrence time, latest occurrence time, critical activities and project completion time.

Activity	Dependence	Duration (Days)
A	--	9
B	--	4
C	--	7
D	B, C	8
E	A	7
F	C	5
G	E	10
H	E	8
I	D, F, H	6
J	E	9
K	I, J	10
L	G	2

(OR)

10. Consider a PERT project for which the following activities and the time estimates (optimistic, pessimistic and most likely times) have been obtained. 14M

Draw the network and determine the:

- (i) Expected project duration, its variance and standard deviation.
- (ii) Probability that the project is completed (a) as per schedule (b) 2 days earlier than expected.

Activity	(a, b, m)
1,2	5,8,6
1,4	1,4,3
1,5	2,5,4
2,3	4,6,5
2,5	7,10,8
2,6	8,13,9
3,4	5,10,9
3,6	3,5,4
4,6	4,10,8
4,7	5,8,6
5,6	9,15,10
5,7	4,8,6
6,7	3,5,8

[B17ME3101]

**[B17ME3102]**  
**III B. Tech I Semester (R17) Regular Examinations**  
**IC ENGINES & GAS TURBINES**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). What is the difference between air standard cycle approximation, fuel-air cycle approximation and real cycle performance? 7M
- (b). Draw the theoretical and actual valve timing diagram for a four stroke C.I. engine and discuss in brief the deviations between the two. 7M

**(OR)**

2. (a). Distinguish between four stroke and two stroke engines. 7M
- (b). An 8 cylinder, 4 stroke diesel engine has a power output of 368kW at 800rpm. The fuel consumption is 0.238kg/kW-h. The pressure in the cylinder at the beginning of injection is 35bar and the maximum cylinder pressure is 60bar. The injection of fuel is expected to be at 210bar and the maximum pressure at the injector is set to be at about 600bar. Calculate the orifice area required for each injector if the injection takes place over 12° crank angles. Assume the coefficient of discharge for the injector is 0.6, specific gravity of fuel is 0.85 and the atmospheric pressure is 1.013bar. Take the effective pressure difference to be the average pressure difference during the injection period. 7M

**UNIT-II**

3. (a). Explain the effect of various engine variables on SI engine knock. 7M
- (b). Describe the different phases of combustion phenomenon in SI engines with suitable sketches. 7M

**(OR)**

4. (a). Discuss the effect of turbulence and compression ratio on the combustion characteristics in S.I. Engine. 7M
- (b). Explain the influence of operating parameters on knocking in S.I.Engine. 7M

**UNIT-III**

5. (a). What are different stages of combustion in CI Engine, and Explain with p-θ diagram. 7M
- (b). Explain the method of testing an I.C. Engine working diesel cycle 7M

**(OR)**

6. (a). Explain the various factors that influence the flame speed. 7M
- (b). Write a short note on delay period in CI engines. 7M

**UNIT-IV**

7. (a). Derive the expression for maximum pressure ratio of multi stage reciprocating compressor. 7M
- (b). A single acting, single cylinder reciprocating air compressor is compressing 20kg/min. of air from 110kPa. 30°C to 600kPa and delivers it to a receiver. 7M

Law of compression is  $pV^{1.25} = \text{constant}$ . Mechanical efficiency is 80%. Find the power input to compressor, neglecting losses due to clearance, leakages and cooling.

**(OR)**

8. (a). Explain the working principle of vane type rotary compressor along with a diagram. 7M
- (b). Air at 1.01325 bar and 288K enters an axial flow compressor stage with an axial velocity of 150 m/s. There are no inlet guide vanes. The rotor stage has a tip diameter of 60 cm and a hub diameter of 50 cm and rotates at 100 rps. The air enters the rotor and leaves the stator in the axial direction with no change in its velocity or radius. The air is turned through 30.20 as it passes through the rotor. Assume a stage pressure of 1.2, Calculate power required and degree of reaction. 7M

**UNIT-V**

9. (a). State the advantages and disadvantages of inter-cooling in gas turbine plant. 7M
- (b). A gas turbine plant, that makes use of Brayton cycle in an application, takes in air at 1.2 bar (abs) and 20<sup>0</sup>C temperature and compresses it through a pressure ratio of 8. It is then heated to 850<sup>0</sup>C in a combustion chamber and is expanded back to a pressure of 1.2 bar (abs). Calculate 7M
- (i) The work done,  
(ii) The cycle efficiency and  
(iii) The work ratio. It is given that the isentropic efficiencies of the turbine and the compressor are respectively, 80% and 70%

**(OR)**

10. (a). What are the types of rocket engines. 7M
- (b). A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610<sup>0</sup>C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Air enters the compressor at 15<sup>0</sup>C at the rate of 16kg/s. Calculate 7M
- i) work required for compression  
ii) power developed by the turbine  
iii) Net power output in kilowatts
- Take  $C_p=1.005 \text{ kJ/kgk}$  and  $\gamma=1.4$  for the compression process, and  
 $C_p=1.11 \text{ kJ/kgk}$  and  $\gamma=1.333$  for the expansion process.

**[B17ME3102]**

[B17ME3103]

III B. Tech I Semester (R17) Regular Examinations  
KINEMATICS OF MACHINES  
MECHANICAL ENGINEERING  
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 70 M

Answer **ONE** Question from **EACH** UNIT.

All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

- (a). Explain the types of kinematic pairs 7M

(b). Describe the any three inversions of a double slider crank chain with a neat sketch. 7M

**(OR)**
- (a). Explain the Mobility of Mechanisms 7M

(b). Sketch and describe all the inversions of a single slider crank chain 7M

**UNIT-II**

- (a). Locate all the instantaneous centers of the slider crank mechanism as shown in Fig.1 the length of crank OB and connecting rod AB are 100mm and 400mm respectively if the crank rotates clockwise with an angular velocity of 10 rad/s, find (i) velocity of slider (ii) angular velocity of the connecting rod AB 7M

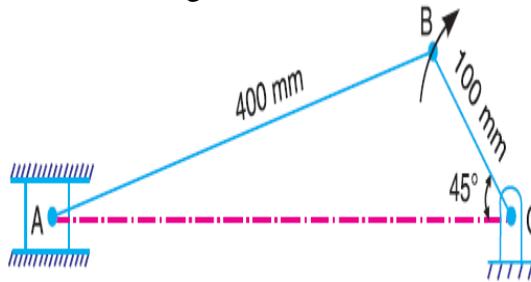


Fig. 1

- (b). Fig.2 shows a mechanism in which  $OA=QC=100\text{mm}$ ,  $AB=QB=300\text{mm}$  and  $CD=250\text{mm}$  7M  
the crank OA rotates at 150 rpm in the clockwise direction Determine the (i) velocity of slider at D (ii) Angular velocities of links QB and AB (iii) Rubbing velocity at the pin B which is 40mm diameter

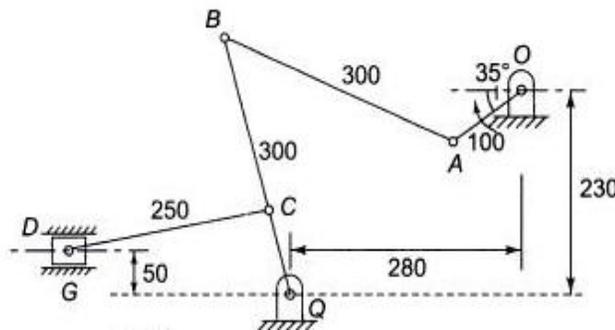


Fig. 2

**(OR)**

- (a). Explain the Coriolis component of acceleration 7M

- (b). PQRS is a four bar chain as shown in Fig.3 with links PS fixed the length of the links are PQ=62.5mm, QR=175mm,RS=112.5mm and PS=200MM.The crank PQ rotates at 10rad/s clockwise Draw the velocity and acceleration diagram when angle PQS=60° and Q and R lie on same side of PS Find the angular velocity and angular acceleration of links QR and RS 7M

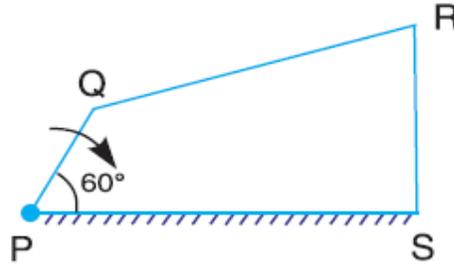


Fig. 3

### UNIT-III

5. (a). Explain the Scott Russel and modified Scott Russel mechanism 7M  
 (b). Sketch a Paucellier mechanism. Show that it can be used to trace a straight line 7M  
 (OR)
6. (a). Explain the Conditions for correct steering 7M  
 (b). Derive an Expression for the ratio of shaft velocities for the Hooke's joint ( $\omega / \omega_1$ ) 7M

### UNIT-IV

7. (a). What is a cam? classify the types of cams 5M  
 (b). Design a cam for operating the exhaust valve of an oil engine. It is required to give equal uniform acceleration and retardation during opening and closing of the valve each of which corresponds to 60° of cam rotation. The valve must remain in the fully open position for 20° of cam rotation. 9M  
 The lift of the valve is 37.5 mm and the least radius of the cam is 40 mm. The follower is provided with a roller of radius 20 mm and its line of stroke passes through the axis of the cam.

(OR)

8. (a). Explain the types of followers 5M  
 (b). A cam is to be designed for a knife edge follower with the following data : 9M  
 1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.  
 2. Dwell for the next 30°.  
 3. During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.  
 4. Dwell during the remaining 180°.  
 Draw the profile of the cam when  
 (a) the line of stroke of the follower passes through the axis of the cam shaft, and The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

**UNIT-V**

9. (a). A pair of involute spur gears with  $16^\circ$  pressure angles and pitch of module 6mm is in mesh. the no of teeth on pinion is 16 and its rotational speed is 240r.p.m. when the gear ratio is 1.75,find in order that the interference is just avoided; (i)the addendum on pinion and gear wheel(ii)the length of path of contact 7M
- (b). What is interference? Derive an expression for the minimum number of teeth required on the pinion in order to avoid interference in involute gear teeth when it meshes with wheel. 7M

**(OR)**

10. (a). An epicyclic gear consist of a pinion, a wheel of 40 teeth and an annulus with84 teeth concentric with the wheel .The pinion gears with the wheel and annulus. The arm that carries the axis of the pinion rotates at 100rpm.If the annulus is fixed, find the speed of the wheel. 7M
- (b). An epicyclic gear train consist of a sun wheel **S** , a stationary internal gear **E** and 3 identical planet wheels **P** carried on a star -shaped planet carrier **C**. The size of different toothed wheels are such that the planet **C** rotates at  $1/5^{\text{th}}$  of the speed of the sun wheel **S**. The minimum Number of teeth on any wheel is 16.The driving torque on the sun wheel is 100N-m.Determine (i) Number of teeth on different wheels of the train 7M

**[B17ME3103]**

[B17ME3104]

III B. Tech I Semester (R17) Regular Examinations  
DESIGN OF MACHINE ELEMENTS  
MECHANICAL ENGINEERING  
MODEL QUESTION PAPER

TIME: 3Hrs.

Max. Marks: 70 M

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

**UNIT-I**

1. (a). Write a short note on maximum shear stress theory and maximum strain energy theory. 6M
- (b). A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to (a) maximum principal stress, (b) maximum shear stress and (c) maximum distortion strain energy theory of yielding. 8M

**(OR)**

2. It is required to design a knuckle joint to connect two circular rods subjected to an axial tensile force of 50 kN. The rods are co-axial and a small amount of angular movement between their axes is permissible. The material for two rods and pin may be selected as plain carbon steel of Grade 30C8 ( $S_{yt} = 400 \text{ N/mm}^2$ ). The factor of safety for all parts may be assumed as 5. Design the joint and specify the dimensions of its components. 14M

**UNIT-II**

3. (a). What are the Goodman line, Soderberg line and Gerber curve? 6M
- (b). A solid circular shaft, 15 mm in diameter is subjected to torsional shear stress, which varies from 0 to  $35 \text{ N/mm}^2$  and at the same time, is subjected to an axial stress that varies from  $-15$  to  $+30 \text{ N/mm}^2$ . The frequency of variation of these stresses is equal to the shaft speed. The shaft is made of steel FeE 400 ( $S_{ut} = 540 \text{ N/mm}^2$  and  $S_{yt} = 400 \text{ N/mm}^2$ ) and the corrected endurance limit of the shaft is  $200 \text{ N/mm}^2$ . Determine the factor of safety. 8M

**(OR)**

4. (a). What is stress concentration factor and what are the causes of stress concentration? 7M
- (b). A machine component is subjected to two-dimensional stresses. The tensile stress in the X direction varies from 40 to  $100 \text{ N/mm}^2$  while the tensile stress in the Y direction varies from 10 to  $80 \text{ N/mm}^2$ . The frequency of variation of these stresses is equal. The corrected endurance limit of the component is  $270 \text{ N/mm}^2$ . The ultimate tensile strength of the material of the component is  $660 \text{ N/mm}^2$ . Determine the factor of safety used by the designer. 7M

**UNIT-III**

5. A steel plate subjected to a force of 3 kN and fixed to a vertical channel by means of four identical bolts is shown in Figure 1. The bolts are made of plain carbon steel 45C8 ( $S_{yt} = 380 \text{ N/mm}^2$ ) and the factor of safety is 2. Determine the diameter of the shank. 14M

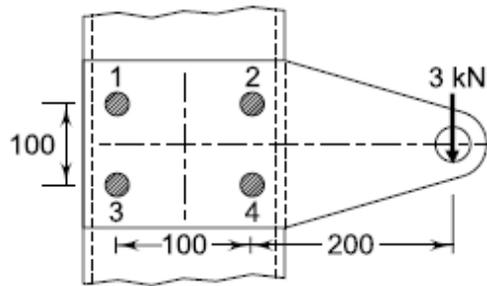


Figure 1

(OR)

6. A welded connection of steel plates is shown in Figure 2. It is subjected to an eccentric force of 50 kN. Determine the size of the weld, if the permissible shear stress in the weld is not to exceed  $70 \text{ N/mm}^2$ . 14M

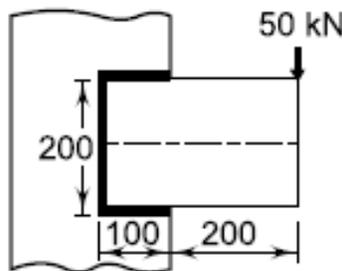


Figure 2

UNIT-IV

7. A shaft is supported by two bearings placed 1 m apart. A 600 mm diameter pulley is mounted at a distance of 300 mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.25 kN. Another pulley 400 mm diameter is placed 200 mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is  $180^\circ$  and  $\mu = 0.24$ . Determine the suitable diameter for a solid shaft, allowing working stress of 63 MPa in tension and 42 MPa in shear for the material of shaft. Assume that the torque on one pulley is equal to that on the other pulley. 14M

(OR)

8. Design a muff coupling to connect two shafts transmitting 40 kW at 120 r.p.m. The permissible shear and crushing stress for the shaft and key material (mild steel) are 30 MPa and 80 MPa respectively. The material of muff is cast iron with permissible shear stress of 15 MPa. Assume that the maximum torque transmitted is 25 per cent greater than the mean torque. 14M

UNIT-V

9. (a). What is surge in spring? 4M  
 (b). A helical compression spring is required to deflect through approximately 25 mm when the external force acting on it varies from 500 to 1000 N. The spring index is 8. The spring has square and ground ends. There should be a gap of 2 mm between adjacent coils when the spring is subjected to the maximum force of 1000 N. The spring is made of cold-drawn steel wire with ultimate tensile strength of  $1000 \text{ N/mm}^2$  and permissible shear stress in the spring wire should 10M

be 50% of the ultimate tensile strength ( $G = 81370 \text{ N/mm}^2$ ). Design the spring and calculate: (a) wire diameter; (b) mean coil diameter; (c) number of active coils; (d) total number of coils; (e) solid length; (f) free length; (g) required spring rate; and (h) actual spring rate.

**(OR)**

10. (a). Write a short note on nipping in springs and shot peening 4M  
(b). It is required to design a helical compression spring subjected to a force of 500 N. The deflection of the spring corresponding to this force is approximately 20 mm. The spring index should be 6. The spring is made of cold-drawn steel wire with ultimate tensile strength of  $1000 \text{ N/mm}^2$ . The permissible shear stress for the spring wire can be taken as 50% of the ultimate tensile strength ( $G = 81370 \text{ N/mm}^2$ ). Design the spring and calculate: (a) wire diameter; (b) mean coil diameter; (c) number of active coils; (d) total number of coils; (e) free length of the spring; and (f) pitch of the coils. Assume a gap of 1 mm between adjacent coils under maximum load condition. The spring has square and ground ends. 10M

**[B17ME3104]**

**[B17ME3105]**  
**III B. Tech I Semester (R17) Regular Examinations**  
**FLUID MACHINES & SYSTEMS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Derive the expression for the force exerted by the jet on stationary inclined flat plate. 7M
- (b). A 75 mm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Find the normal pressure on the plate (i) when the plate is stationary, (ii) when the plate is moving with a velocity of 15 m/s and away from the jet. Also determine the power and the efficiency of the jet when the plate is moving. 7M

**(OR)**

2. (a). Prove that the workdone per second on a series of moving curved vanes by a jet of water striking at one of the tips of the vane is given by workdone /sec =  $\rho a v_1 [V_{w1} \pm V_{w2}] \times u$  7M
- (b). A Jet of water of diameter 75 mm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assuming the plate smooth find: (i) Force exerted on the plate in the direction of jet; (ii) power of the jet; (iii) Efficiency of the jet 7M

**UNIT-II**

3. (a). What is governing of turbines? Why it is necessary? What is the effect, if the turbines are not governed? 7M
- (b). The hub diameter of a Kaplan turbine, working under a head of 12 m, is 0.35 times the diameter of the runner. The turbine is running at 100 rpm. If the vane angle of the extreme edge of the runner at outlet is 15°, and the flow ratio 0.6, find: (i) diameter of the runner & (ii) discharge through the runner. 7M
- The velocity of whirl at outlet is given as zero.

**(OR)**

4. (a). Explain characteristic curves of hydraulic turbines. 7M
- (b). A turbine is to operate under a head of 25 m at 200 rpm. The discharge is 9m<sup>3</sup>/sec. If the efficiency is 90%, determine the performance of the turbine under a head of 20 m. 7M

**UNIT-III**

5. (a). Define cavitation. What are the effects of cavitation in hydraulic machines? 7M
- (b). The internal and external diameters of the impeller of a centrifugal pump of 200 mm and 400mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per kg of water. 7M

**(OR)**

6. (a). Derive an expression for minimum speed of starting a centrifugal pump. 7M  
 (b). Two geometrically similar pumps are running at same speed of 1000 r.p.m. one pump has an impeller diameter of 0.30 m and lifts water at the rate of 20 lit/sec against a head of 15 m. determine the head and impeller diameter of the other pump to deliver half the discharge 7M

**UNIT-IV**

7. (a). Explain the working of single acting reciprocating pump with a neat sketch. 7M  
 (b). A single acting reciprocating pump has piston diameter 12.5 cm, and stroke length 30 cm. The center of the pump is 4 m above the water level in the sump. The diameter and length of suction pipe are 7.5 cm and 7 m respectively. The separation occurs if the absolute pressure head in the cylinder during suction stroke falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head as 10.3m of water. 7M

**(OR)**

8. (a). Difference between Centrifugal pumps and Reciprocating pumps 7M  
 (b). A cylinder of single acting reciprocating pump is 150 mm in diameter and 300mm in stroke. The pump is running at 30 rpm. and discharge water to a height of 12 m. The diameter and length of the delivery pipe are 0.1m and 30 m respectively. If a large air vessel is fitted in the delivery pipe at a distance of 2 m from the centre of the pump, find the pressure head in the cylinder (i) At the beginning of the delivery stroke; (ii) In the middle of the delivery stroke Take  $f=0.01$ . 7M

**UNIT-V**

9. (a). Write a short note on hydraulic press. 7M  
 (b). Explain the working of a hydraulic torque converter unit. 7M
- (OR)**
10. (a). Explain with a neat sketch the working of air lift pump. Mention its advantages. 7M  
 (b). Explain with a neat sketch of differential hydraulic accumulator. 7M

**[B17ME3105]**

**[B17ME3106]**  
**III B. Tech I Semester (R17) Regular Examinations**  
**INDUSTRIAL MEASUREMENTS & METROLOGY**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain the static performance characteristics of an instrument. 7M  
(b). Illustrate the construction and working of a Hydraulic dynamometer. 7M

**(OR)**

2. (a). Define accuracy and precision, list out the factors that effect them. 7M  
(b). Explain the construction and working of a Mc-leod gauge with a neat sketch. 7M

**UNIT-II**

3. (a). Illustrate the construction and working of a temperature sensor. 7M  
(b). Discuss in detail about various properties of optical fibers. 7M

**(OR)**

4. (a). Sketch and explain seismographic instrument for measuring vibrations. 7M  
(b). Illustrate the construction and working of an optic sensor configuration. 7M

**UNIT-III**

5. (a). Illustrate the measurement of major diameter of a screw thread. 7M  
(b). Define and List out the advantages of Interchangeability. 7M

**(OR)**

6. (a). Illustrate the measurement of tooth thickness of a spur gear. 7M  
(b). Explain the construction, working and applications of rolling gear tester. 7M

**UNIT-IV**

7. (a). Illustrate the construction and working of an Autocollimator. 7M  
(b). Explain pneumatic comparator with a neat sketch. 7M

**(OR)**

8. (a). Describe the working principle of Optical projector with a neat sketch. 7M  
(b). State and explain any one technique for flatness measurement 7M

**UNIT-V**

9. Illustrate the alignment tests performed on radial drilling machine 14M

**(OR)**

10. (a). Write a brief note on various parameters effecting surface texture. 7M  
(b). Describe any method to measure surface texture? 7M

**[B17ME3106]**

**[B17ME3201]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**INDUSTRIAL ENGINEERING & MANAGEMENT**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Elucidate Henry Fayol's principles of management in brief. 7M  
(b). Define committee and comment on different types of committees. 7M

**(OR)**

2. (a). Summarize different theories of motivation. 7M  
(b). Establish the causes of Industrial disputes. 7M

**UNIT-II**

3. (a). Elaborate different types of productions. 7M  
(b). Encapsulate the process of Product design and development. 7M

**(OR)**

4. (a). Given the weight (x) Vs growth (y) data, find the regression line for predicting the growth and calculate the growth for a weight value of 50.  
{(x, y)} = {(12, 5.5); (18, 5.9); (24, 6.5); (30, 7.4); (36, 8.2); (42, 8.9); (48, 8.6)} 7M  
(b). Illuminate on progress control. 7M

**UNIT-III**

5. (a). Present a brief note on the factors affecting plant location. 7M  
(b). What is your idea about assembly line balancing? With the help of Travel chart technique design the best possible layout, if the number of movements between different departments (A; B; C; D; E; F) in the present layout are as follows: A to B are 15; B to C, 25; A to F, 20; C to D, 16; D to C, 8; D to F, 41; E to F, 12 and F to E, 15. 7M

**(OR)**

6. (a). Why is it important to study about material handling? Explain the concept of Unit load, stating the importance of Palletization and Containerization. 7M  
(b). Present a note on some important material handling equipment along with their industrial applications. 7M

**UNIT-IV**

7. (a). Clarify different types of process charts. 7M  
(b). Explicate the principles of motion economy in brief. 7M

**(OR)**

8. (a). What is S.I.M.O Chart? Expound its constructional procedure. 7M  
(b). Estimate the standard time in a work sampling study conducted for 100 years in a machine shop. The total number of observations recorded were 2500. No working activity could be noticed for 400 observations. The ratio between manual and machine elements was 2:1. Average rating factor was estimated as 7M

1.15 and the total number of articles produced during the study period were 6000. Rest and personal allowances may be taken as 12% of the normal time.

**UNIT-V**

9. (a). Describe the purchasing function and what are the objectives of purchasing department? 7M  
(b). Outline the functions of Stores Department and the duties of the Store keeper. 7M

**(OR)**

10. (a). State the characteristics of double sampling plan along with its procedure. 7M  
(b). Calculate the control limits for plotting the fraction defective in ten samples of size 300. The number of defective pieces found in each sample is (25, 41, 37, 48, 15, 20, 26, 30, 40, and 28). 7M

**[B17ME3201]**

**[B17ME3202]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**CONTROL SYSTEMS**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

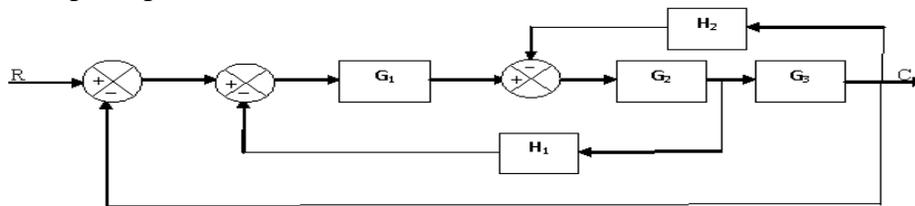
Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

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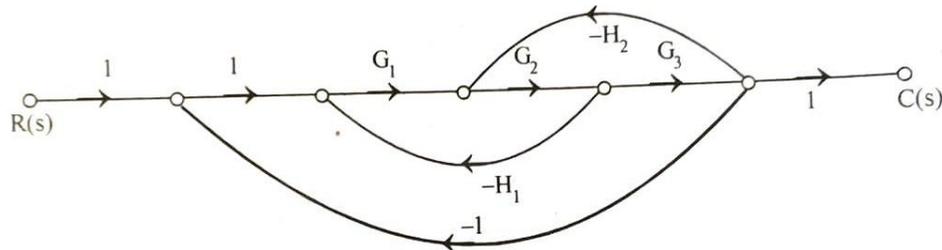
**UNIT-I**

1. (a). Differentiate between open-loop and closed-loop systems. List the advantages and disadvantages of both systems. 4M
- (b). Find the transfer function of the given block diagram by using block diagram reduction principles. 10M



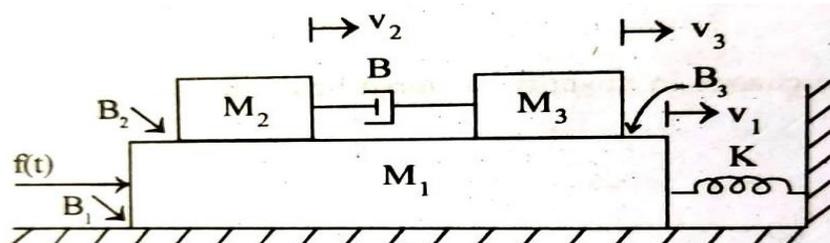
(OR)

2. (a). What are the components of feedback control system and explain them in detail. 4M
- (b). Using Mason's gain formula find the overall transfer function of the given signal flow graph. 10M



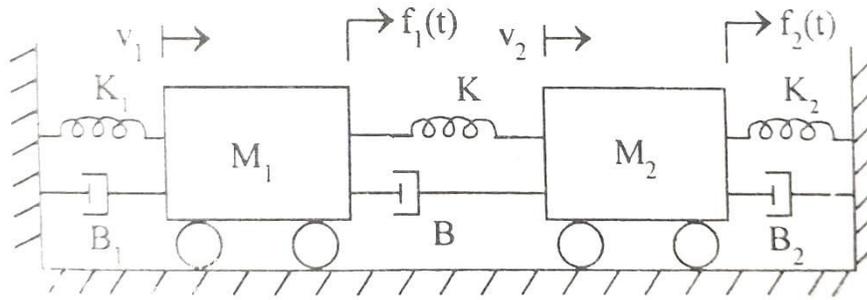
**UNIT-II**

3. (a). Write the differential equations governing the given mechanical system and obtain the transfer function of the system. 14M



(OR)

4. Write the differential equations governing mechanical system shown in the figure below and draw its force-voltage electrical analogous circuit. 14M



### UNIT-III

5. (a). Define state transition matrix and mention its properties. 4M  
 (b). A linear system described by the state equation 10M  
 $\dot{X}(t) = AX(t) + Bu(t)$  where  
 $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$   
 Find state transition matrix.

(OR)

6. (a). Define state of a system and state variables. 4M  
 (b). Determine the transfer matrix for the system given below. 10M

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 3 \\ -2 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} u(t)$$

$$c(t) = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

### UNIT-IV

7. (a). What is order of a system? 4M  
 (b). Discuss the time response analysis of first order system when subjected to unit step and ramp input. 10M

(OR)

8. (a). Explain transient response specifications. 4M  
 (b). For unity feedback system having open loop transfer function as given below 10M  
 determine  
 (i) type of system  
 (ii) Error constants  $K_p$ ,  $K_v$ , and  $K_a$ .  
 (iii) Steady state error for parabolic input.

$$G(s) = \frac{K(s+2)}{s^2(s^2+7s+12)}$$

### UNIT-V

9. The following are characteristic polynomial of systems. Determine the location of root on s-plane and hence the stability of the system. 14M  
 (a)  $S^7+5S^6+9S^5+9S^4+4S^3+20S^2+36S+36=0$   
 (b)  $S^5+4S^4+8S^3+8S^2+7S+4=0$

(OR)

10. The open loop transfer function of a system is given below. Determine the stability of closed loop system. If the closed loop system is not stable then find the number of closed-loop poles lying on the right half of s-plane. 14M

$$G(s)H(s) = \frac{(1 + 4s)}{s^2(1 + s)(1 + 2s)}$$

**[B17ME3202]**

**[B17ME3203]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**DYNAMICS OF MACHINES**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain in what way the gyroscopic couple effects the motion of an aircraft while taking a turn. 7M
- (b). An aeroplane makes a complete half circle radius 100m towards left when flying at 210 km/h. The rotary engine and the plane is of 50 kg mass having a radius of gyration of 300 mm. The engine rotates at 2400 rpm clockwise as seen from the rear. Find the gyroscopic couple on the aircraft and its effect on the plane. 7M

**(OR)**

2. (a). A rear engine automobile is travelling along a track of 100 metres mean radius. Each of the four road wheels has a moment of inertia of 2.5 kg-m<sup>2</sup> and an effective diameter of 0.6 m. The rotating parts of the engine have a moment of inertia of 1.2 kg-m<sup>2</sup>. The engine axis is parallel to the rear axle and the crankshaft rotates in the same sense as the road wheels. The ratio of engine speed to back axle speed is 3 : 1. The automobile has a mass of 1600 kg and has its centre of gravity 0.5 m above road level. The width of the track of the vehicle is 1.5 m. Determine the limiting speed of the vehicle around the curve for all four wheels to maintain contact with the road surface. Assume that the road surface is not cambered and centre of gravity of the automobile lies centrally with respect to the four wheels. 14M

**UNIT-II**

3. (a). Explain primary direct and reverse cranks . 5M
- (b). A, B, C and D are four masses carried by a rotating shaft at radii 100,125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. 9M

**(OR)**

4. (a). Effect of partial balancing of reciprocating parts of two cylinder locomotives( various tractive force and swaying couple) 5M
- (b). The following data represents 4 cylinder vertical inline engine speed 310rpm length of crank 25cm, length of connecting rod 100cm intermediate cranks are at right angles to each other and reciprocating masses attached to these cranks are 5000n each distance between intermediate cranks are 50cm and are placed symmetrically between extreme cranks is 200cm.If the engine is balanced completely for primary forces and couples Determine orientation of outer cranks and reciprocating masses attached to it determine unbalanced secondary force or couple if any 9M

**UNIT-III**

5. (a). Define and derive the natural frequency of free longitudinal vibrations of single degree freedom system. Using Energy method and Rayleigh's method 7M
- (b). A shaft 50 mm diameter and 3 metres long is simply supported at the ends and carries three loads of 1000 N, 1500 N and 750 N at 1 m, 2 m and 2.5 m from the left support. The Young's modulus for shaft material is 200 GN/m<sup>2</sup>. Find the frequency of transverse vibration 7M

(OR)

6. (a). What do you mean by whirling of shaft? Derive the expression for amplitude of vibration of shaft supporting a disc at the mid span 7M
- (b). Explain the torsional vibrations of two rotor system 7M

**UNIT-IV**

7. (a). An electric motor driven power screw moves a nut in a horizontal plane against a force of 75 kN at a speed of 300 mm/min. The screw has a single square thread of 6 mm pitch on a major diameter of 40 mm. The coefficient of friction at the screw threads is 0.1. Estimate power of the motor. 7M
- (b). Define pivot and derive the expression for flat pivot bearing with (i) Uniform pressure & (ii) Uniform wear. 7M

(OR)

8. (a). A single plate clutch is required to transmit 8KW at 1000 rpm. The axial pressure is limited to 70 KN/m<sup>2</sup>. The mean radius of the plate is 4.5 times the radial width of the friction surface. If both the sides of the plate are effective and the coefficient of friction is 0.25, find the (i) Inner and Outer radii of the plate and the mean radius & (ii) Width of the friction lining 7M
- (b). The turning moment diagram of a petrol engine is drawn to a vertical scale of 1mm=500N-m on a horizontal scale of 1mm=8° the turning moment diagram will be for every half revolution the area above and below the mean torque lines are 260, 580, 80,380,870 and 250mm<sup>2</sup> respectively. Mass of the flywheel is 55kg and radius of gyration 2.1m engine rotates at a mean speed of 1600rpm. Determine the coefficient of fluctuation of speed. 7M

**UNIT-V**

9. (a). Each arm of a porter governor is 200mm long and is pivoted on the axis of rotation. The radii of rotation of the balls at the minimum and the maximum speeds are 120mm and 160mm. The mass of the sleeve is 24kg and each ball is 4kg. Find the range of speed of the governor. Also find the range of speed if the friction at the sleeve is 18N. 14M

(OR)

10. (a). Define sensitiveness, isochronism and hunting of a governor 6M
- (b). A hartnell governor having a central sleeve spring and two right angled bell crank levers moves between 290r.p.m and 310 r.p.m for a sleeve lift of 15mm. The sleeve arms and the ball arms are 80mm and 120mm respectively The levers are pivoted at 120mm from the governor axis and mass of each ball is 2.5kg .The ball arms are parallel to the governor axis at the lowest equilibrium speed .Determine (i) load on the spring at the lowest and the highest equilibrium speeds and (ii)stiffness of the spring 8M

[B17ME3203]

**[B17ME3204]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**MACHINE DESIGN**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT I**

1. A pair of  $20^\circ$  full depth spur gear transmits 30kw at speed of 250rpm of the pinion. 14M  
The velocity ratio is 1:4. The pinion is made of steel having allowable stress of 100Mpa, while the gear is made of C.I. having a static stress of 55Mpa. The pinion has 20 teeth and face width is 12.5 times the module. Find module, face width, pitch diameters, also check for wear load

**(OR)**

- 2 A pair of helical gears is to transmit 15 kW. The teeth are  $20^\circ$  stub in diametral plane 14M  
and have a helix angle of  $45^\circ$ . The pinion runs at 10000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given  $\sigma_{es} = 618$  MPa

**UNIT-II**

- 3 A four stroke diesel engine has the following specifications : 14M  
Brake power = 5 kW; Speed = 1200 r.p.m.; Indicated mean effective pressure = 0.35 N/mm<sup>2</sup>; Mechanical efficiency = 80 %. Determine: (i) bore and length of the cylinder; (ii) thickness of the cylinder head; and (iii) size of studs for the cylinder head.

**(OR)**

- 4 Design a cast iron piston for a single acting four stroke engine for the following data: 14M  
Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm<sup>2</sup>, Indicated mean effective pressure = 0.75 N/mm<sup>2</sup> ; Mechanical efficiency = 80% , Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel =  $42 \times 10^3$  kJ/kg ; Speed = 2000 r.p.m. Any other data required for the design may be assumed

**UNIT-III**

5. A cone clutch is to be designed to transmit 7.5 KW at 900 rpm. The cone has an face 14M  
angle of  $12^\circ$  The width of the face is half of the mean radius and normal pressure between the contact surfaces is not to exceed 0.09 N/mm<sup>2</sup> Assuming uniform wear condition and coefficient of friction as 0.2. Find the dimensions of the clutch and axial force necessary to engage the clutch..

**(OR)**

6. With the help of neat sketch explain the working of internal expanding shoe brake 14M

**UNIT-V**

7. Design a journal bearing to resist a load of 8KN. The oil used has a viscosity of 0.0087 kg/m-sec at operating temperature of 80<sup>0</sup>c, shaft speed is 720rpm. Bearing diametral clearance is 0.25mm and ambient temperature is 30<sup>0</sup>c. if the heat radiating capacity of the bearing is 150 w/m<sup>2</sup>/<sup>0</sup>c, determine whether artificial cooling is necessary. 14M

**(OR)**

8. Design a self-aligning ball bearing for a radial load of 7000 N and a thrust load of 2100 N. The desired life of the bearing is 160 millions of revolutions at 300 r.p.m. Assume uniform and steady load, 14M

**UNIT-V**

9. Select a wire rope for a vertical mine hoist to lift a load of 50kN from a depth of 250meters. A rope speed of 480 meters/min is to be attained in 18seconds. 14M

**(OR)**

10. Design a chain drive to actuate a compressor from 15 kW electric motor running at 1000 r.p.m., the compressor speed being 350 r.p.m. The minimum centre distance is 500 mm. The compressor operates 16 hours per day. The chain tension may be adjusted by shifting the motor on slides. 14M

**[B17ME3204]**

**[B17BS3207]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**ENTREPRENEURSHIP (Open Elective)**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain about growth of entrepreneurship in India. 7M  
(b). Discuss Government of India policy measures to promote Women entrepreneurship in India. 7M

**(OR)**

2. (a). Explain the measures taken by Government of India for developing rural entrepreneurship in the country. 7M  
(b). Explain the role of NGOs in developing rural entrepreneurship. 7M

**UNIT-II**

3. (a). How do you design an appropriate training programme for new and existing entrepreneurs? Suggest suitable training institutions that can undertake the designed training programme. 7M  
(b). Write brief notes creativity and entrepreneurship. 7M

**(OR)**

4. (a). Briefly explain mobility of entrepreneur. 7M  
(b). Outline in nutshell various sources and methods of ideas generation training programmes. 7M

**UNIT-III**

5. Explain about the contents and formulation of project report. 14M

**(OR)**

6. Explain about the concept and methods of project evaluation 14M

**UNIT-IV**

7. Explain the features, advantages and disadvantages of Proprietorship, partnership, companies and cooperatives. 7M

**(OR)**

8. Discuss the support provided by National Small Industries Corporation Ltd (NSIC) and Small Industries Development Organization (SIDO) to small scale industries in the country. 7M

**UNIT-V**

9. (a). Briefly elucidate role of commercial banks in promoting micro and small entrepreneurs with examples. 7M  
(b). Outline role of educational institutions in promoting entrepreneurship 7M

**(OR)**

10. (a). What is meant by prefeasibility study? 7M  
(b). Discuss about the feasibility report preparation and evaluation criteria for business plan. 7M

**[B17BS3207]**

**[B17CS3213]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**DATABASE MANAGEMENT SYSTEM**  
**(Open Elective)**  
**(Common to CE & ME)**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Who are the different database users? Explain their interfaces to databasemanagement system. 7M  
(b). Describe the client server architecture for the database with necessary diagram. 7M

**(OR)**

2. (a). Briefly explain the Database Design process. 7M  
(b). Define these terms: Entity, Entity set, Attribute, Key. 7M

**UNIT-II**

3. (a). What is NULL? What is its importance? How are these values handled in relational model? 7M  
(b). Consider the following database schema to write queries in SQL 7M

Sailor(sid, sname, age, rating)

Boats(bid, bname, bcolor)

Reserves(sid, bid, day)

i) Find the sailors who have reserved a red boat

ii) Find the names of the sailors who have reserved at least two boats

iii) Find the colors of the boats reserved by 'Mohan'.

**(OR)**

4. (a). Explain following in brief 7M  
i. Triggers  
ii. Assertions  
(b). Define the terms: Entity Set, Role, Relationship set, Aggregation. 7M

**UNIT-III**

5. (a). How to compute closure of set of functional dependency? Explain with a suitable example schema 7M  
(b). What is multi valued dependency? State and explain fourth normal form based on this concept 7M

**(OR)**

6. (a). What is the need for schema refinement? Explain with examples. 7M  
(b). Describe the properties of decomposition 7M

**UNIT-IV**

7. (a). Define transaction and explain desirable properties of transactions. 7M  
(b). What is a trigger? How to create it? Discuss various types of triggers. 7M

**(OR)**

8. (a). Explain the transaction support in SQL 7M  
(b). Does two phase locking protocol ensure serializability? Justify your answer 7M

**UNIT-V**

- |             |   |    |
|-------------|---|----|
| 9.          | (a). Discuss the concept of cylinder and its benefit in disk organization | 7M |
|             | (b). Is B+ tree, a multi level indexing? How does it differ from B-tree?  | 7M |
| <b>(OR)</b> |   |    |
| 10.         | (a). Explain page formats with examples.                                  | 7M |
|             | (b). Discuss bulk loading of B+ tree with illustrations                   | 7M |

**[B17CS3213]**

**[B17CE3207]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**WASTE WATER MANAGEMENT(Open Elective)**  
**(Common to CE & ME)**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain the physical and chemical characteristics of industrial wastes. 7M
- (b). Explain the environmental impacts due to improper disposal of industrial wastes. 7M

**(OR)**

2. (a). List the various sources of water required for industries. Explain the quality of water required for industrial processing 7M
- (b). What is meant by effluent standards? Explain the standards as per BIS for safe disposal. 7M

**UNIT-II**

3. (a). Explain the process of heavy metal removal employed in industries. 7M
- (b). Explain reed bed technology in detail. 7M

**(OR)**

4. (a). Explain aerobic and anaerobic biological treatment of waste. 7M
- (b). Explain about equalization and neutralization processes in detail. 7M

**UNIT-III**

5. (a). Explain the waste reduction by ion exchange process. 7M
- (b). List various membrane technologies used for waste minimization. Explain any one of them in detail. 7M

**(OR)**

6. (a). Explain the ozonation technique for waste minimization. 7M
- (b). Explain the various characteristics of industrial waste water effluent. 7M

**UNIT-IV**

7. (a). Explain how sludge is digested by aerobic and anaerobic digesters. 7M
- (b). Explain different methods of industrial sludge disposal. 7M

**(OR)**

8. (a). Explain the effluent disposal methods in detail. Enumerate the advantages and disadvantages of the methods employed. 7M
- (b). Explain the characteristics of industrial effluent and sludge. What steps are necessary for their safe treatment and disposal. 7M

**UNIT-V**

9. (a). Explain the treatment process adopted in tannery industries. 7M
- (b). Explain the treatment process used in textile industries with a neat sketch. 7M

**(OR)**

10. (a). Explain briefly the characteristics and treatment of cane sugar mill effluent with the aid of a flow chart 7M
- (b). Write briefly about the regulatory liabilities in industrial waste water treatment. 7M

**[B17CE3207]**

**[B17CS3210]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**COMPUTER GRAPHICS (Open Elective)**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). What is the role of digital to analog converter (DAC)? Where is it placed in video display devices? **7M**  
(b). Explain the mechanism of increasing the colors/gray levels without increasing the frame buffer memory. **7M**

**(OR)**

2. (a). Explain at least five applications of computer graphics. **7M**  
(b). Explain the construction and working of CRT. **7M**

**UNIT-II**

3. (a). Explain at least five attributes for output primitives. **7M**  
(b). Discuss about the reflections required for generating the complete circle using the first octant of the origin centered circle. **7M**

**(OR)**

4. (a). Draw the flow chart for Bresenham's incremental circle algorithm in the first octant. **7M**  
(b). Compare and contrast between DDA and bresenhams line algorithm. **7M**

**UNIT-III**

5. (a). Discuss about the basic transformations on object. **7M**  
(b). Discuss about reflection & shearing **7M**

**(OR)**

6. (a). Describe the steps involved for cohen-sutherland outcode line clipping algorithm with an example. **7M**  
(b). Explain boundary filling algorithm using 8-pixel method in detail. **7M**

**UNIT-IV**

7. (a). Distinguish between isometric, parallel projections. **7M**  
(b). Explain with a neat sketch, how the view plane is defined with respect to centre of projections and the object defined is 3-D space **7M**

**(OR)**

8. Derive transformation matrix for rotation of an object about an arbitrary axis. **14M**

**UNIT-V**

9. (a). Explain various 3D object representation mechanisms **7M**  
(b). Explain the methods to view a 3d object. **7M**

**(OR)**

10. (a). Explain about B-spline curves **7M**  
(b). Explain about Beizer curves **7M**

**[B17CS3210]**

**[B17ME3205]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**INDUSTRIAL ROBOTICS (Open Elective)**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). How do you specify a robot? Is robotics automation? Discuss the different classification systems of robots. 7M
- (b). Define the terms 'Robot' and 'Robotics'. Discuss the role of robots in engineering. 7M

**(OR)**

2. (a). What are the different actuators used in the robots? Describe them briefly 7M
- (b). Discuss the different feedback components used in robots. 7M

**UNIT-II**

3. Explain briefly the two stage control of manipulator using interpolation of end effectors position method. 14M

**(OR)**

4. Explain in detail about forward and inverse transformations used in robotics 14M

**UNIT-III**

5. (a). Explain the following for smoothing of image: i) Neighborhood averaging ii) Image averaging method 7M
- (b). Discuss the current applications of machine vision system. 7M

**(OR)**

6. (a). Explain the working of magnet grippers used for robots. 7M
- (b). Discuss the applications and working principle of the following sensors. i) Range sensors ii) Acoustic sensors iii) Tactile sensors. 7M

**UNIT-IV**

7. Discuss the textual robot language structure with the help of block diagram. 14M

**(OR)**

8. Discuss the relative merits and demerits of different textual robot languages. 14M

**UNIT-V**

9. What are the various robot cell layouts? Describe any two with the help of neat sketches. 14M

**(OR)**

10. What are the various fields in which the robots used? Discuss them in detail. 14M

**[B17ME3205]**

**[B17ME3206]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**GREEN ENGINEERING SYSTEMS (Open Elective)**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Explain any two instruments used for measuring solar radiation with neat sketches. 7M
- (b). Give the significance of solar energy. 7M

**(OR)**

2. (a). What are the advantages and disadvantages of concentrating collectors over the flat plate collectors? 7M
- (b). Enumerate the different types of concentrating type collectors 7M

**UNIT-II**

3. (a). Describe the layout and working of a continuous solar cooling system. 7M
- (b). Discuss the advantages and disadvantages of horizontal and vertical axis windmill. 7M

**(OR)**

4. (a). Classify the methods of solar energy storage. 7M
- (b). Explain the working of OTEC plant with the help of neat schematic layout? 7M

**UNIT-III**

5. (a). What is a solar pond? Explain the zonation of solar pond with neat sketch. 7M
- (b). How are wind energy systems classified? Explain. 7M

**(OR)**

6. (a). How are Bio mass plants classified? Explain them briefly. 7M
- (b). Discuss about the modifications required to IC engine for using bio fuels? 7M

**UNIT-IV**

7. (a). Explain the role of selection of fuels in environmental friendly environment 7M
- (b). Discuss about variable voltage variable frequency drives 7M

**(OR)**

8. (a). Explain the energy efficient lightning control methods. 7M
- (b). Explain why centrifugal machines offers the greatest savings when used with Variable Speed Drives 7M

**UNIT-V**

9. (a). What is zero waste manufacturing? Explain. 7M
- (b). List the benefits of green manufacturing systems over current systems 7M

**(OR)**

10. (a). Explain the classification of fuel cells based on type of electrolyte. 7M  
(b). Explain the role of environmental sustainable company in energy management 7M

**[B17ME3206]**

**[B17ME3207]**  
**III B. Tech II Semester (R17) Regular Examinations**  
**COMPUTER AIDED DESIGN**  
**MECHANICAL ENGINEERING**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 70 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

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**UNIT-I**

1. (a). Discuss the working principles of following input devices. (i) cursor control devices (ii) digitizers. 7M
- (b). Write the benefits of CAD. 7M

**(OR)**

2. (a). Explain in detail about creating database for manufacturing. 7M
- (b). What are the processes involved in the general design process? Explain each. 7M

**UNIT-II**

3. (a). What are the basic techniques used in current computer graphics terminals for generating the image on the CRT screen. Explain briefly with illustrations. 7M
- (b). A rectangle is formed with vertices A(50, 50), B(100, 50), C( 100, 80) & D( 50,80). (i) Calculate the new co –ordinates of the rectangle reduced to in size using a scaling factor of 0.5,0.6; (ii) If the rectangle is reduced to square of side equal to smaller side of the rectangle. 7M

**(OR)**

4. What are types of geometric modelling techniques? Explain in detail. 14M

**UNIT-III**

5. (a). What do you understand by Finite Element Modeling? Give an example of modeling a mechanical component. 7M
- (b). Give details of various types of element shapes usually employed for modeling components. 7M

**(OR)**

6. (a). What are the steps involves in the Finite Element Modeling? And explain each. 7M
- (b). Write short notes on automatic mesh generation with an illustrative example. 7M

**UNIT-IV**

7. (a). Explain the salient features of ANSYS package in detail. 7M
- (b). Explain about the computer aided design of a coil spring in details 7M

**(OR)**

8. (a). What are softwares available for FEM? Give their features. 7M
- (b). Explain the computer aided analysis of kinematics of crank slider mechanism 7M

**UNIT-V**

9. (a). Discuss the application of AI in the design. 7M
- (b). Explain the importance of inference process. 7M

**(OR)**

10. What is an expert system? What are the various components of an expert system? How it is related to artificial intelligence? 14M

**[B17ME3207]**