Code: 7GC14

I B.Tech. I Semester Supplementary Examinations June 2022
Engineering Mathematics-I
(Common to All Branches)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　　　　　Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

****

UNIT–I

1.　Find the Rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ -2 & -3 & 1 & 2 \\ -3 & -4 & 5 & 8 \\ 1 & 3 & 10 & 14 \end{bmatrix}$

OR

2.　Verify Cayley-Hamilton theorem for the matrix for the matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 4 & 3 & 2 \\ 2 & 4 & 3 \end{bmatrix}$

UNIT–II

3. a)　Show that the Eigen values of a Hermitian matrix are all real

　 b)　Show that $\dfrac{1}{2}\begin{bmatrix} 1+i & -1+i \\ 1+i & 1-i \end{bmatrix}$ is a unitary matrix

OR

4.　Show that $A = \begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is Skew-Hermitian and also unitary matrix.

UNIT–III

5. a)　Solve $(1 + y^2)dx = (\tan^{-1} y - x)dx$

　 b)　Solve $\dfrac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$

OR

6.　If the temperature of a body is changing from 100^0c to 70^0c in 15 minutes, find when the temperature will be 40^0c, if the temperature of air is 30^0c.

UNIT–IV

7.　Solve $\dfrac{d^2 y}{dx^2} + a^2 y = \operatorname{Tan} ax$ by the method of variation of parameters.

OR

8.　Solve $\dfrac{d^3 y}{dx^3} - y = e^x + \sin 3x + 2$

UNIT–V

9.　If $x + y + z = u, y + z = uv, z = uvw, then\ evaluate\ \dfrac{\partial(x, y, z)}{\partial(u, v, w)}$

OR

10.　Find the maxima and minima of $z = x^3 + 3x y^2 - 3x^2 - 3y^2 + 4$

***

I B.Tech. I Semester Supplementary Examinations June 2022
Problem Solving Techniques and C Programming
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
****

Marks

UNIT–I

1. a) Define Computer? Explain hardware and software components of a computer.
   b) Write and algorithm and draw a flow chart to calculate percentage of a student in six subjects.

OR

2. a) Explain different types of computer languages in detail.
   b) What is Keyword? Write and explain any ten keywords in C programming language.

UNIT–II

3. a) Define operator? Describe different types of operators used in c language with example.
   b) What are formatted input and output functions in used in C explain with an example.

OR

4. a) Explain different data types in C programming language.
   b) Evaluate the following expression by using rules of precedence and associativity.
      i) $4 / 3 + 5 - 2 + 3 / 5$
      ii) $3 * 6 + 9 - 10 / 6$

UNIT–III

5. a) What is an Array? Explain how to declare and initialize a one dimensional arrays in C with an example.
   b) Write code segments for displaying numbers from 1 to 10 using while, do..while and for statements.

OR

6. a) Write a C Program to check weather given number is Armstrong number or not
   b) Write a C program to accept and print the elements in a two dimensional arrays.

UNIT–IV

7. Explain about any four string handling functions with an example.

OR

8. Write a C program to find the given string is palindrome or not.

UNIT–V

9. a) What is a function? Describe different categories of function with suitable example programs.
   b) Write a C program to find factorial of a number using recursion.

OR

10. a) What is the scope of variables of type extern, auto, register and static? Explain with example.
    b) Describe any four preprocessor command with suitable examples.

***

Code: 7G512

I B.Tech. I Semester Supplementary Examinations June 2022

Engineering Mechanics - Statics

(Common to CE & ME)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

****

Marks

UNIT–I

1. a) Explain various types of force system with neat sketches.
   b) Differentiate between
      i) Coplanar and non-coplanar forces
   ii) Moment of a force and couple.

OR

2. a) Define
      i) Newton's first and second laws
      ii) Law of transmissibility of forces.
   b) A cord supported at A and B carries a load of 10 KN at D and a load of W at C as shown in Fig. 3. Find the value of W so that CD remains horizontal.
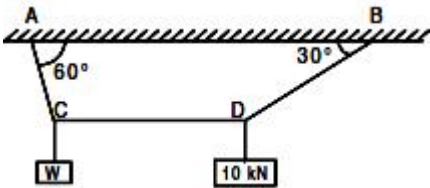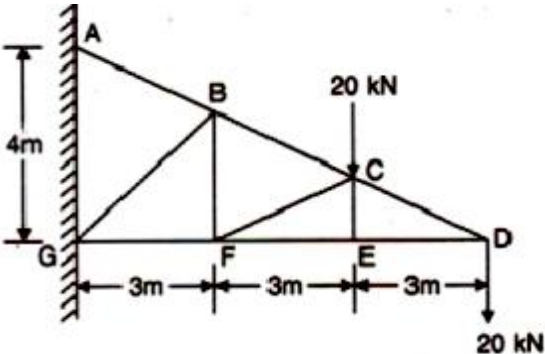

UNIT–II

3. a) Explain various types of loads acting on beams.
   b) A beam AB is located supported and loaded as shown in Figure. Find the reactions at the supports.
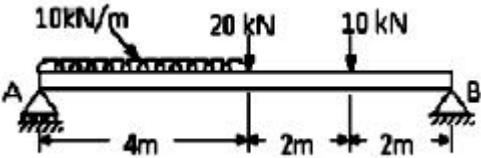
OR

4. a) Determine the forces in the members BC, BF and FG of the frame shown in fig.3 by method of sections.. Indicate the nature of force also

UNIT–III

5. a) A ladder 5m long and weight of 250N is placed against a vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 800N climbs the ladder. At what position will he induce slipping? The co-efficient of friction for both the contact surfaces of the ladder with the wall and the floor is 0.2.

OR

6. a) A block of weight W1= 200 N rests on a horizontal surface and supports on top of it another block of weight W2= 50 N. The block W2 is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force P, applied to the lower block as shown, that will be necessary to cause slipping to impend. The coefficient of static friction for all contact surfaces is µ=0.3 as shown in figure.
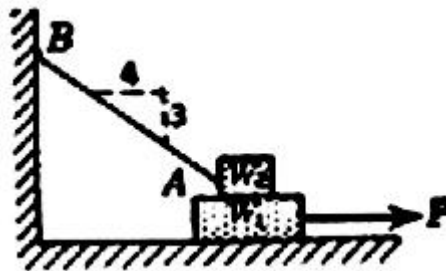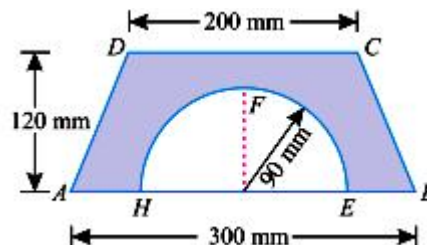

UNIT–IV

7. a) State and explain Pappus and Guldinus theorems.

   b) Determine surface area and volume of sphere using the Pappus and Guldinus theorems.

OR

8. A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig.

Find the position of the centre of gravity of the figure.

UNIT–V

9. a) State and prove parallel axis theorem.

   b) State and prove perpendicular axis theorem.

OR

10. A brass cone with base diameter of 400 mm and height of 225 mm is placed on a vertical aluminium cylinder of height 300 mm and diameter 400 mm. Density of brass=$85 kN/m^3$ and density of aluminium =25.6 kN/m^3. Determine the mass moment of inertia of the composite body about the vertical geometrical axis.

***

I B.Tech. I Semester Supplementary Examinations June 2022
Engineering Chemistry
(Common to CE, ME & CSE)

Max. Marks: 70   Time: 3 Hours
Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)
****

Marks

UNIT–I

1. a) How do you determine dissolved oxygen present in a water sample by Winkler's method?
   b) What is external treatment of water? Write about ion-exchange resins. Explain the Ion exchange process for the treatment of industrial water.

OR

2. a) Calculate temporary and permanent hardness of water sample having composition $Ca(HCO_3)_2$ = 16.2ppm Mg $(HCO_3)_2$=14.6ppm, $CaSO_4$ = 13.6, $MgSO_4$ = 12ppm, $MgCl_2$ = 9.5ppm
   b) What is break point chlorination? State its significance.

UNIT–II

3. a) Describe the working procedure of electrochemical sensors with suitable examples
   b) i. Why does a dry cell become dead after a long time even if it has not been used?
   ii. Can we use a nickel spatula to stir a solution of copper sulphate? Give reasons
   iii. A fuel cell is considered better than an electric power plant using the same fuel. why

OR

4. a) Explain various factors that influence corrosion of metals
   b) Give reasons for the following
   i. Metal under water drop undergoes accelerated corrosion
   ii. Rusting of iron is quicker in saline water than in ordinary water
   iii. Small anodic area results in intense corrosion

UNIT–III

5. a) Differentiate between thermoplastics and thermosetting plastics
   b) Write a brief notes on Vulcanization and compounding of rubber

OR

6. a) What is latex? How natural rubber is isolated from it? What is vulcanization? How does it improve the properties of natural rubber
   b) Describe the preparation, properties and engineering applications of Buna-S and Buna-N rubbers

UNIT–IV

7. Define calorific value of a fuel? Distinguish gross and net calorific value of fuel?

OR

8. What are the characteristics of metallurgical coke? Describe the manufacture for metallurgical coke by Otto Hoffmann's byproduct method?

UNIT–V

9. a) Define lubricant? Explain any two properties of lubricants
   b) Explain thick film lubricating mechanism

OR

10. a) What is the composition of Portland cement? Describe the manufacture of Portland cement with dry method?
    b) What is setting and hardening of cement? Explain various reactions involved in setting and hardening of cement.

***