Hall Ticket Number :										

R-17

Code: 7GC14

I B.Tech. I Semester Supplementary Examinations December 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)

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UNIT–I

1. a) Find the eigen values and eigen vectors of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

   b) Prove that if $a_1, a_2, a_3, \ldots\ldots a_n$ are eigen values of A then $a_1^2, a_2^2, a_3^2, \ldots\ldots a_n^2$ are the eigen values of A^2. 7M

OR

2. If $A=\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ verify Cayley-Hamilton theorem. Find A^4 and A^{-1} using Cayley-Hamilton. 14M

UNIT–II

3. Show that the matrix $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ is Skew-Hermitian and hence find eigen values and eigen vectors. 14M

OR

4. a) Prove that The Eigen values of a Hermitian matrix are all real. 7M

   b) Define Hermitian, skew-Hermitian, Unitary Matrices and give example for each 7M

UNIT–III

5. a) A bacterial culture, growing exponentially, increases from 100 to 400gms in 10 Hrs. How much was present after 3 Hrs. from the initial instant? 7M

   b) Find the orthogonal trajectory of the family of confocal conics

   $\frac{x^2}{a^2}+\frac{y^2}{b^2+a}=1$, where a being the parameter. 7M

OR

6. Find the orthogonal Trajectories of the family of curves $x^2+y^2+2gx+c=0$ where g is parameter. 14M

UNIT–IV

7. Solve $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+4y=8x^2e^{2x}\sin 2x$ 14M

OR

8. Using the Method of variation of Parameters, solve $\frac{d^2y}{dx^2}-y=\frac{2}{1+e^x}$ 14M

UNIT–V

9. Prove that (if 0<a<b<1), $\frac{b-a}{1+b^2}<\tan^{-1}b-\tan^{-1}a<\frac{b-a}{1+a^2}$. Hence show that $\frac{®}{4}+\frac{3}{25}<\tan^{-1}\frac{4}{3}<\frac{®}{4}+\frac{1}{6}$. 14M

OR

10. a) Verify Rolle's theorem for $\frac{\sin x}{e^x}$ in $(0,®)$. 7M

    b) Verify Lagrange's mean value theorem for $f(x)=(x-1)(x-2)(x-3)$ in $[0,4]$ 7M

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Hall Ticket Number :										

R-17

Code: 7GC12

I B.Tech. I Semester Supplementary Examinations December 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)

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UNIT–I

1. a) Differentiate temporary and permanent hardness of water. 7M
   b) What is break point chlorination? State its significance? 7M

OR

2. a) Describe the desalination process by reverse osmosis with a neat sketch. 7M
   b) Write a note on internal treatment? 7M

UNIT–II

3. Explain the composition ,applications and advantages of the following cells (i)Ni-Cd cell & (ii) Lithium ion cell. 14M

OR

4. a) What is concentration cell corrosion and galvanic corrosion? 7M
   b) Calculate the standard emf of Ni-Ag cell whose E^0_{Ni} and E^0_{Ag} are -0.25 and +0.83 respectively also write cell representation. 7M

UNIT–III

5. a) Write a note on vulcanization of rubber. 7M
   b) explain the synthesis, mechanism and applications of carbohydrates 7M

OR

6. a) Write a note on compounding of rubber? 7M
   b) Explain with examples the terms: addition polymerization, condensation polymerization and co-polymerization. 7M

UNIT–IV

7. a) What is meant by power alcohol? Write the preparation and properties of power alcohol. 7M
   b) Classify the fuels with examples? 7M

OR

8. a) Write a note on production and uses of producer gas, water gas and Bio gas. 7M
   b) Define knocking? Write about octane number? 7M

UNIT–V

9. Explain the mechanism of (i) thin film lubrication, (ii) thick film lubrication 14M

OR

10. a) What are lubricants? Write any three properties and applications of lubricants. 7M
    b) What are refractories? Discuss any three properties of refractories? 7M

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Hall Ticket Number :										

R-17

Code: 7G512

I B.Tech. I Semester Supplementary Examinations December 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)

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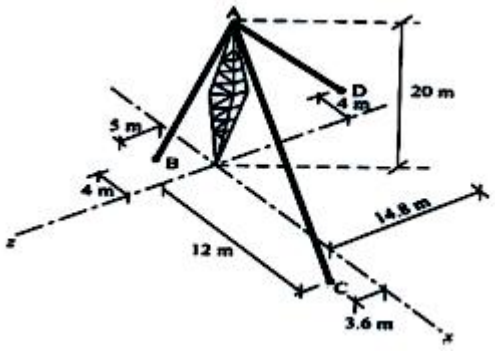
UNIT–I

1. A transmission tower is held by three guy wires AB, AC and AD anchored by bolts at B, C and D respectively. If the tension in AB is 2100 N, determine the components of the force exerted by the wire on the bolt B.

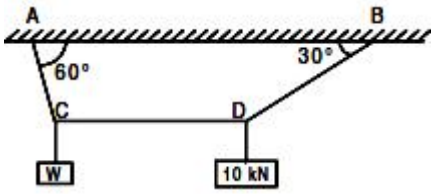


14M

OR

2. a) State and prove Varignon's theorem. 6M

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.

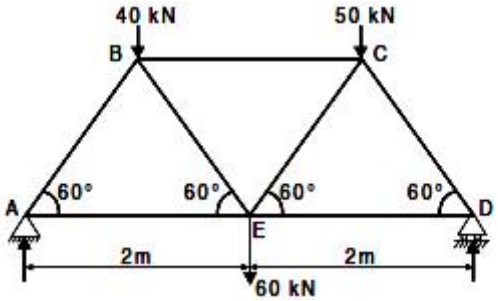


8M

UNIT–II

3. a) Discuss the assumptions made in the analysis of simple truss. 4M

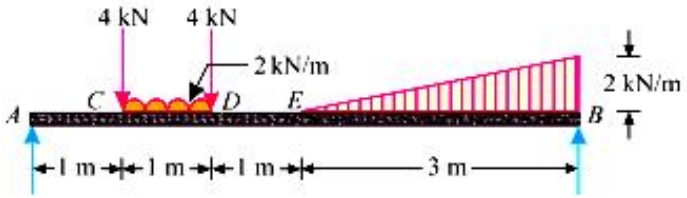
b) Determine the forces in all the members of the truss shown in Fig. and indicate the magnitude and nature of forces on the diagram of the truss. All inclined members are at 60° to horizontal and length of each member is 2 m.



10M

OR

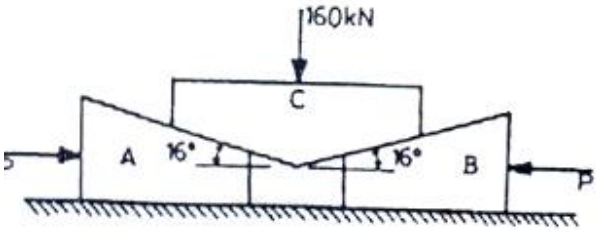
4. A simply supported beam is loaded as shown in figure. Find the reactions.



14M

UNIT–III

5. A weight of 160 kN is to be raised by means of the wedges A and B as shown in figure. Find the value of force P for impending motion of block C upwards, if coefficient of friction is 0.25 for all surfaces. Weights of the block C and the wedges may be neglected.



14M

OR

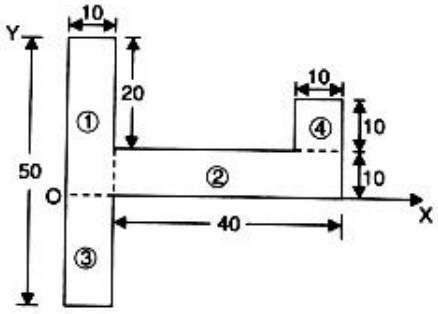
6. a) State the laws of static and dynamic friction. 6M

b) Define the terms : Friction, limiting force of friction, co-efficient of friction and angle of friction. 4M

c) Explain the concept of cone of friction. 4M

UNIT–IV

7. Locate the Center of gravity of the area as shown in figure with respect to coordinate axes. All dimensions are in mm.



14M

OR

8. a) Explain the terms centre of gravity and centroid 6M

b) State and explain Pappus and Guldinus first and second theorems. 8M

UNIT–V

9. 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. 14M

OR

10. a) State and prove parallel axis theorem. 7M

b) Derive the expression for moment of inertia of a triangle about centroidal axis. 7M

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Hall Ticket Number :										

R-17

Code: 7G111

I B.Tech. I Semester Supplementary Examinations December 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)

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UNIT–I

1. a) Differentiate between computer hardware and software 7M
   b) Write an algorithm to find product of two integers using repetitive addition 7M

OR

2. a) Explain in detail about the software development method. 7M
   b) List and explain various symbols used in flowcharts with figures 7M

UNIT–II

3. a) Discuss about operator precedence in expression evaluation with a suitable example. 7M
   b) Give the format for conditional operator. When is it used? 7M

OR

4. a) Explain different data types supported by C language with their memory requirements. 7M
   b) Describe the structure of a C program with example 7M

UNIT–III

5. a) Write a C Program to check weather given number is Amstrong number or not 7M
   b) Explain the significance of ‘break’ and ‘continue’ statement with a sample program. 7M

OR

6. a) Write ‘C’ program to print the Fibonacci sequence. 7M
   b) In what way a do – while loop differs from while loop. Explain. 7M

UNIT–IV

7. a) Write a program to print an array in reverse order 7M
   b) Write a C Program to delete ‘n’ characters in a given string 7M

OR

8. a) What is an Array? How to declare and initialize a one dimensional array? 4M
   b) Explain different string manipulation functions with example 10M

UNIT–V

9. a) What is the scope of variables of type extern, auto, register and static? Explain with example. 10M
   b) What is meant by user defined function? Explain with an example C program 4M

OR

10. a) What is a function? What are its advantages? Explain various parameter passing techniques. 10M
    b) Write a function that checks whether a given year is leap year or not. 4M

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