Hall Ticket Number :										

R-17

Code: 7GC14

I B.Tech. I Semester Supplementary Examinations August 2021

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 solutions of the system of equations: x+2y-z=0, 2x+y+z=0, x-4y+5z=0 7M

   b) Prove that if a is an eigen value of a non-singular matrix A corresponding to the eigen vector X then a^{-I} is an eigen value of A^{-1} and corresponding eigen vector X itself. 7M

OR

2. a) Solve the equations x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0 7M

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

UNIT–II

3. a) Define a model matrix, Diagonalize the Matrix A= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ 7M

   b) Show that A = $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is a skew-Hermitian matrix and also unitary matrix 7M

OR

4. Reduce the quadratic form $-3x_1^2 - 3x_2^2 - 3x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3$ to the canonical form. Find Index and Signature. 14M

UNIT–III

5. a) Solve $\left(1+y^2\right)+\left(x-e^{\tan^{-i} y}\right)\frac{dy}{dx}=0$ 7M

   b) If 30% of a radioactive substance disappears in 10 days, how long will it take for 90% of it to disappear? 7M

OR

6. a) Solve $\frac{dy}{dx}+y\tan x=y^2\sec x$ 7M

   b) Find the Orthogonal Trajectories of the family of curves $x^2+y^2=a^2$ 7M

UNIT–IV

7. a) Solve $\left(D^2+1\right)y=\sin x\sin 2x+e^x x^2$ 7M

   b) Solve $\frac{d^2y}{dx^2}+y=\cos ec\, x$ by the method of variation of parameters. 7M

OR

8. a) Solve by the method of variation of parameters $\frac{d^2y}{dx^2}-2\frac{dy}{dx}=e^x\sin x$ 7M

   b) Solve $(D+2)(D-1)^2 y=e^{-2x}+2\sinh x$ 7M

UNIT–V

9. a) If $x=r\sin^{-}\cos¤$, $y=r\sin^{-}\sin¤$, $z=r\cos^{-}$, Show that $\frac{\partial(x,y,z)}{\partial(r,^{-},¤)}=r^2\sin^{-}$ 7M

   b) Find the maxima and minima of $z=x^3+3xy^2-3x^2-3y^2+4$ 7M

OR

10. A rectangular box open at the top is to have volume of 32 cubic ft. find the dimensions of the box requiring least material for its construction. 14M

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Hall Ticket Number :										

R-17

Code: 7G512

I B.Tech. I Semester Supplementary Examinations August 2021

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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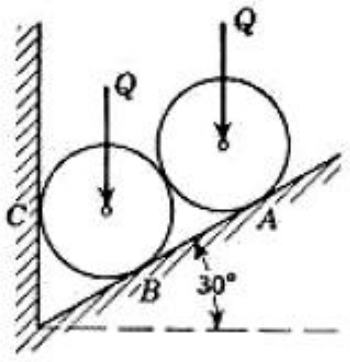
UNIT–I

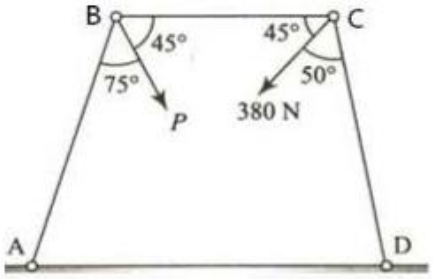
1. Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in fig. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.



14M

OR

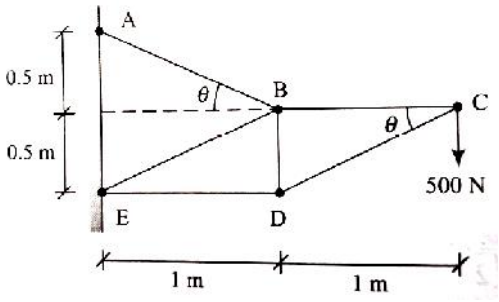
2. In the four-bar mechanism ABCD, as shown in fig. below, determine the force P for equilibrium.



14M

UNIT–II

3. Compute the axial forces in the members of the plane truss as shown in fig.



14M

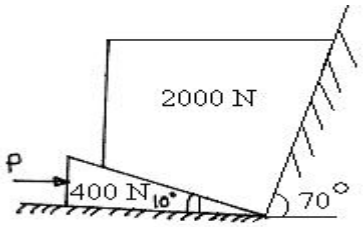
OR

4. a) What is a frame? State the difference between a perfect frame and an imperfect frame. 4M

   b) A simply supported beam AB is subjected to a distributed load increasing from 1500 N/m to 4500 N/m from end A to end B respectively. The span AB = 6 m. Determine the reactions at the supports. 10M

UNIT–III

5. Determine the horizontal force P to start the 400 N wedge moving the right. The angle of friction is 20^0 to all contact surfaces.

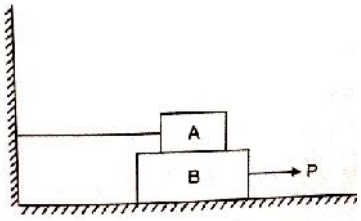


14M

OR

6. a) State the laws of friction. 4M

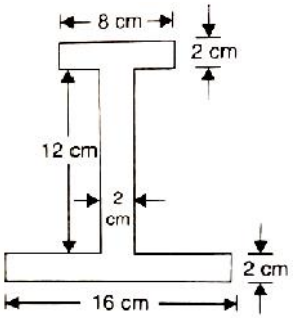
b) Block-A weighing 1000N rests over block B which weighs 2000N as shown in fig. Block A is tied to wall with a horizontal string. If the coefficient of friction between blocks A and B is 0.25 and between B and floor is 1/3, what should be the value of P to move the block B.



10M

UNIT–IV

7. Find the centroid of the I-section shown in fig.



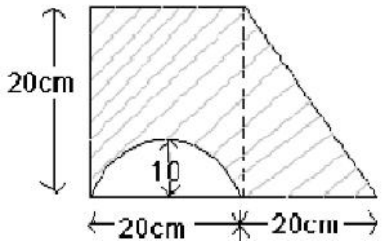
14M

OR

8. In a steel cylinder with a 20cm base diameter and a 30cm height, a vertical hole of 4cm base diameter is drilled upto half the depth from the top and the portion is filled with lead, whose density is 11370 kg/m^3. Determine the centre of mass of the composite body.Take the density of steel as 7850 kg/m^3. 14M

UNIT–V

9. Find the moment of inertia for the in the figure. 4 Find the moment of inertia for the hatched area parallel to centroidal x – axis.



14M

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 = 85kN/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

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Hall Ticket Number :										

R-17

Code: 7GC12

I B.Tech. I Semester Supplementary Examinations August 2021

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) Write short notes on
   i) Scale and sludge
   ii) Caustic embrittlement 7M

   b) Discuss in brief the boiler corrosion. How is it controlled? 7M

OR

2. What are ionic exchange resins? Explain the ion-exchange method of softening water. Write reactions involved. Discuss the advantages of this method 14M

UNIT–II

3. a) What is the principle underlying conductometric titration? Discuss the titration curve obtained for a titration between HCl and NaOH. 7M

   b) Explain the construction and working of H2-O2 fuel cell with neat sketch and chemical reactions 7M

OR

4. a) On what factors does the conductance of a solution depend? How would you proceed to determine the conductivity of a solution? 7M

   b) Explain passivity of metals. How it affects rate of corrosion 7M

UNIT–III

5. a) Explain the differences between thermoplastics and thermosetting plastics with examples 7M

   b) Write a brief note on Vulcanization and compounding of rubber 7M

OR

6. a) Why silicones are called inorganic polymers? Discuss the synthesis of linear and cross linked silicones. 7M

   b) Describe the preparation, properties and engineering applications of Buna-N rubber 7M

UNIT–IV

7. a) Define net and gross calorific values of a fuel. How are they determined experimentally for solid fuels? 7M

   b) A sample of Coal on analysis was found to contain the following. C = 73.0 %, H_2 = 3.2 %, O_2=7.0 %, S = 1.5 %, N_2 = 2.9 %. Calculate the quantity of air required for complete combustion of 1 kg of this coal 7M

OR

8. a) Write a note on synthesis of petrol from Fischer Tropsch's synthesis. 7M

   b) Explain the following
   i) Natural gas ii) Water gas iii) Biogas 7M

UNIT–V

9. a) What is the significance of flash & fire point, cloud & pour point of a good lubricant? 7M

   b) Write functions of lubricants 7M

OR

10. a) Describe the mechanism of extreme pressure lubrication 5M

    b) Explain the measurement and significance of the following properties of lubricant
    (i) Viscosity (ii) Aniline point (iii) Neutralization Number 9M

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Hall Ticket Number :										

R-17

Code: 7G511

I B.Tech. I Semester Supplementary Examinations August 2021

Engineering Graphics-I

(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. Construct a Hyperbola, when the distance of the focus from the directrix is equal to 50mm and eccentricity is 3/2. Also draw a tangent and normal to the curve at a point 35mm from the directrix 14M

OR

2. a) Draw an Arc passing through any Three points, which are not in a straight line. 7M

   b) Construct a regular Hexagon of given side 30mm. 7M

UNIT–II

3. Draw an epicycloid of a circle of 40mm diameter, which rolls outside on another circle of 120mm diameter for one revolution clockwise. Draw a tangent and a normal to it at a point 95mm from the centre of the directing circle. 14M

OR

4. Draw an Involute of a circle of diameter 40mm in clockwise. Also draw a tangent and normal to the curve at 90mm from the centre of circle. 14M

UNIT–III

5. A line AB of length 50mm is parallel to both the H.P. and V.P. The line is 25mm above H.P. and 25mm in front of V.P. Draw its projections. 14M

OR

6. A line AB, 55mm long has its end A 25mm in front of the V.P and in the H.P. The line is inclined at 45^0 to the V.P. Draw the projections 14M

UNIT–IV

7. A circular plane of diameter 50mm is perpendicular to both H.P. and V.P. Draw its projections 14M

OR

8. Draw the projections of a circle of 50mm diameter, having its plane vertical and inclined at 30^0 to the VP. Its centre is 30mm above the HP and 20mm in front of the VP. 14M

UNIT–V

9. Draw the projection of cone, base 40mm diameter and axis 65mm long, when it is resting on the ground on a point on its base circle with the axis making an angle of 30^0 with the HP and 45^0 with the VP. 14M

OR

10. A hexagonal prism of base 25mm side and height 65mm has its axis inclined at 45^0 to the HP and has an edge of its base, on the HP and inclined at 30^0 to the VP. Draw its Projections 14M

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Hall Ticket Number :										

R-17

Code: 7G111

I B.Tech. I Semester Supplementary Examinations August 2021

Problem Solving Techniques and C programming

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Describe computer hardware and computer software. 7M

   b) Define Algorithm. Write an Algorithm to read 20 numbers and print their sum. 7M

OR

2. a) Discuss briefly about computer languages. 7M

   b) Explain the software development method in detail. 7M

UNIT–II

3. a) Describe structure of C program with suitable example. 7M

   b) Write a program to find out total and average of three subject marks. 7M

OR

4. a) What is conditional operator? Write a program to enter two numbers and find the smallest out of them. Use conditional operator. 7M

   b) Explain in detail about C data types. 7M

UNIT–III

5. a) With Examples, explain while, do while and for loops 6M

   b) Write a program to find out whether the given number is perfect number or not. 8M

OR

6. Write a program to generate prime numbers between 1 and 1000. (use break statement to reduce number of iterations) 14M

UNIT–IV

7. a) What is an array? How is one dimensional array declared and initialized? 7M

   b) Write a program to find the sum of all elements in an array. 7M

OR

8. a) Discuss all string handling functions in C Language. 7M

   b) Write a program to find whether a given string is palindrome or not. 7M

UNIT–V

9. Explain different storage classes with examples 14M

OR

10. a) Explain the differences between call by value and call by reference with examples. 8M

    b) What is recursive function? Write a program to find factorial of integer value using recursive function. 6M

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