R-14

Code: 4GC13

B.Tech. I Year Supplementary Examinations October 2020
Engineering Chemistry
(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) What is hardness of water? Mention its units?

    b) Describe the desalination process by reverse osmosis with a neat sketch.

OR

2. a) Write a note on internal treatment?

    b) What is break point chlorination? State its significance?

UNIT–II

3. What are fuel cells? Describe the working principle of methanol-oxygen fuel cell with reactions.

OR

4. a) What is concentration cell corrosion and galvanic corrosion?

    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.

UNIT–III

5. a) Distinguish between thermoplastic and thermosetting polymers.

    b) Write a note on compounding of rubber?

OR

6. a) Describe doped conducting polymers with suitable example.

    b) Write a note on vulcanization of rubber.

UNIT–IV

7. a) Discuss any five characteristics of a good fuel?

    b) Classify the fuels with examples?

OR

8. a) Write a note on production and uses of producer gas, water gas and Bio gas.

    b) Define knocking? Write about octane number?

UNIT–V

9. a) What are lubricants? Write any three properties and applications of lubricants.

    b) What are refractories? Discuss any three properties of refractories?

OR

10. Explain the mechanism of (i) thin film lubrication, (ii) thick film lubrication

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R-14

Code: 4G511

B.Tech. I Year Supplementary Examinations October 2020
Engineering Mechanics
(Common to CE & ME)

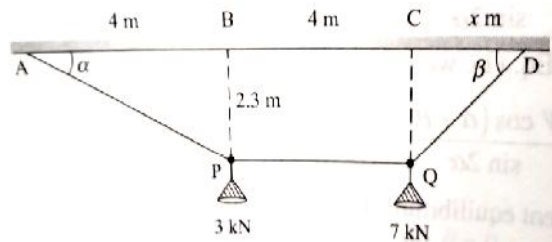Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
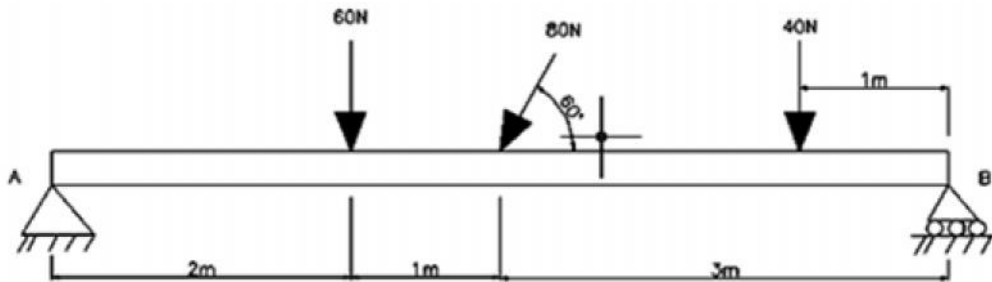*********

UNIT–I

1.   Two loads are suspended from flexible cable APQD as shown in fig. Neglecting self-weight of cable, determine the tension in segments AP, PQ, and QD. Also, determine the values of   and x.


14M

OR

2.   Find the support reactions for the simply supported beam AB loaded as shown in figure.


14M

UNIT–II

3.   A block overlying a 100 wedge on a horizontal floor and leaning against a vertical wall and weighing 1500N is to be raised by applying a horizontal force to the wedge. Assuming the coefficient of friction to be 0.3, determine the minimum horizontal force to be applied to raise the block. As shown in the figure
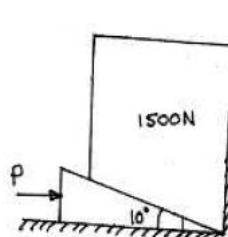
14M

OR

4.   Determine the forces in all the members of the truss shown in fig. Indicate the magnitude and nature of the forces on the diagram.
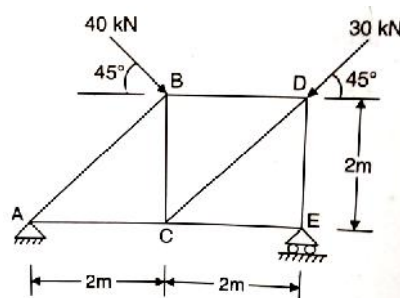
14M

UNIT–III

5. A ladder 5m long and of 250N weight is placed against a vertical wall in a position where its inclination to the vertical is 30⁰. 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 viz. with wall and the floor is 0.2.

14M

OR

6. Define the following:

   i. Friction   ii. Angle of friction

   iii. Limiting friction   iv. Cone of friction

14M

UNIT–IV

7. A square prism of cross section 200mm x 200mm and height 400mm stands vertically and centrally over a cylinder of diameter 300mm and height 500mm. Calculate the mass moment of inertia of the composite solid about the vertical axis of symmetry if the mass density of the material is $2000 kg/m^3$.

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. Two cars are travelling towards each other on a single lane road at the velocities of 12 m/s and 9 m/s respectively. When 100m apart, both drivers realize the situation and applied brakes. Cars are stopped simultaneously at just short of collision. Assume constant deceleration for each case and determine

   i) Time required for cars to stop

   ii) Deceleration of each car

   iii) Distance travelled by each car after applying brake.

14M

OR

10. A glass marble, whose weight is 0.2N, falls from a height of 10m and rebounds to a height of 8m. Find the impulse and the average force between the marble and the floor, if the time during which they are in contact is 1/10 of a second.

14M

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B.Tech. I Year Supplementary Examinations October 2020
Engineering Physics
(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) Write short notes on physical optics. 4M
   b) Explain the Fraunhofer diffraction due to single slit. 10M

OR

2. a) Describe the He-Ne lasers and its applications. 7M
   b) Discuss the principle and working of semiconducting laser. 7M

UNIT–II

3. a) What are Miller indices? Explain the procedure for finding Miller indices. Give one example 7M
   b) Draw the planes (211), (100) and and (220) 7M

OR

4. Prove that FCC is more closely packed than BCC and SC. 14M

UNIT–III

5. a) State and explain Heisenberg uncertainty principle 7M
   b) Define de-Broglie dual nature of energy and derive its wavelength 7M

OR

6. a) Define matter waves and write their properties 7M
   b) Derive Schrödinger 3-D matter wave equation 7M

UNIT–IV

7. a) Write about intrinsic and extrinsic semiconductors. 6M
   b) Derive the expression to compute the charge carrier concentration in the conduction band of an intrinsic semiconductor. 8M

OR

8. a) State and explain Hall effect. 5M
   b) Derive the expression for Hall coefficient and discuss the importance of Hall effect in semiconductors. 9M

UNIT–V

9. a) Define superconductivity? 6M
   b) Describe the effect of magnetic field, heavy current and isotopes on superconductors 8M

OR

10. a) Describe ac & dc Josephson's effect 5M
    b) Mention the applications of Josephson's effect 9M

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B.Tech. I Year Supplementary Examinations October 2020
Mathematics-I
(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) The temperature of the body drops from 100^0c to 75^0c in ten minutes when the surrounding air is at 20^0c temperature. What will be its temperature after half an hour?   7M

    b) Apply the method of variation of parameters to solve $\dfrac{d^2 y}{dx^2} + y = \cos ecx$ 7M

OR

2. a) Prove that system of parabolas $y^2 = 4a(x+a)$ is self-orthogonal.   7M

    b) Solve $(D^2 + 4) y = \cos x$ 7M

UNIT–II

3. a) Obtain the maclaurins series expansions of the following function
        (i) e^x (ii) $\sin x$ (iii) $\cosh x$ 7M

    b) If $u = x^2 - 2y, \ v = x+y+z, \ w = x-2y+3z$ find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ 7M

OR

4. a) Verify Rolle's theorem for $f(x) = 2x^3 + x^2 - 4x - 2$ in $\left[-\sqrt{3}, \sqrt{3}\right]$ 7M

    b) Find the maximum and minimum value of $x^3 + y^3 - 3axy$ 7M

UNIT–III

5. a) Trace the curve $r = a(1 + \cos_{\textit{н}})$ 7M

    b) Evaluate $\iint (x^2 + y^2) dxdy$ in the positive quadrant for which $x + y \le 1$ 7M

OR

6. a) Trace the curve $r = a(1 + \cos_{\textit{н}})$ 7M

    b) Evaluate $\iint (x^2 + y^2) dxdy$ in the positive quadrant for which $x + y \le 1$ 7M

UNIT–IV

7. a) Find the Laplace transform of $e^{-3t}(2\cos 5t - 3\sin 5t)$ 7M

    b) Find the inverse Laplace transform of $\log\left(\dfrac{s+3}{s+4}\right)$ 7M

OR

8. a) Evaluate $L\left\{\dfrac{1-\cos t}{t}\right\}$ 7M

    b) Using Convolution theorem, find $L^{-1}\left\{\dfrac{s}{\left(s^2 + a^2\right)^2}\right\}$ 7M

UNIT–V

9. a) Find the angles between the surface $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2,-1,2)$ 7M

    b) If $\overline{f} = (5xy - 6x^2)\overline{i} + (2y - 4x)\overline{j}$, evaluate $\int_c \overline{f}.d\overline{r}$ along the curve 'c' in xy-plane $y = x^3$ from (1,1) to (2,8).   7M

OR

10. a) (i) If $\overline{f} = (x+3y)\overline{i} + (y-2z)\overline{j} + (x+pz)\overline{k}$ is solenoidal, find p.
        (ii) Find curl $\overline{f}$ where $\overline{f} = grad(x^3 + y^3 + z^3 - 3xyz)$.   7M

    b) Evaluate by Green's theorem $\int_c (y - \sin x) dx + (\cos x) dy$ where 'c' is the triangle enclosed by the lines $y = 0, x = \dfrac{f}{2}, f \ y = 2x$ 7M

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R-14

Code: 4G113

B.Tech. I Year Supplementary Examinations October 2020
Programming in C and Introduction to Data Structures
(Common to CE, EEE, ME and ECE)

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) What is a variable? What are the rules for declaring variables? Give examples of valid and invalid variables
   b) What is an algorithm? Describe the characteristics of an Algorithm

OR

2. Explain the software development method in detail.

UNIT–II

3. a) What are the relational operators? Explain with example.
   b) Write a program to find biggest of three numbers.

OR

4. a) Explain various iterative statements available in C language with examples.
   b) Write a program to find out whether the given number is Armstrong or not?

UNIT–III

5. a) What is library function? Explain about any three-library functions.
   b) What is a pointer? Explain in detail about pointers.

OR

6. a) Define a recursive function? Write a C program to find the factorial of a given integer using recursive function
   b) Write a program in C to search for an element using Linear search technique

UNIT–IV

7. a) What is a FILE? Explain the formatted input and output functions and give examples
   b) Write a program for sorting given numbers using bubble sort technique

OR

8. Write and explain the program for sorting given numbers using bubble sort technique

UNIT–V

9. Define Stack. Explain in detail about stack operations.

OR

10. What is linked list? Write a C program to demonstrate queues using single linked list

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Code: 4G512

B.Tech. I Year Supplementary Examinations October 2020
Engineering Graphics
(Common to CE & ME)

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. Construct an ellipse, when the distance of the focus from the directrix is equal to 55mm and eccentricity is ¾. Also draw tangent and normal to the curve at a point 40mm from the directrix

OR

2. Construct a parabola, when the distance of the focus from the directrix is 50mm. Also draw the tangent on normal to the curve at a point 35mm from the directrix.

UNIT–II

3. Draw the projections of a regular hexagon of 25mm side, having one of its sides in the HP and inclined at 60º to the VP and its surface making an angle of 45º with the HP.

OR

4. A line AB, 65mm long, has its end A 20mm above the H.P. and 25mm in front of the V.P. The end B is 40mm above the H.P. and 65mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P.

UNIT–III

5. A pentagonal pyramid with side of base 30 and axis 60mm long is resting with its base on HP and one of the edges of its base is perpendicular to VP, It is cut by a section plane, parallel to HP and passing through the axis at a point 35 above the base. Draw the projections of the remaining solid.

OR

6. Draw the projections of a pentagonal prism, base 25mm side and axis 50mm long, resting on one of its rectangular faces on the HP, with the axis inclined at 45º to the VP

UNIT–IV

7. A pentagonal pyramid, side of base 30 mm and height 60 mm, stands with its base on H.P and an edge of the base is parallel to V.P. It is cut by a plane perpendicular to V.P, inclined at 40º to H.P and passing through a point on the axis, 32 m above the base. Draw the sectional top view and develop the lateral surface of the truncated pyramid

OR

8. A cone of base 50 mm diameter and height 65 mm rests with its base on H.P. A section plane perpendicular to V.P and inclined at 30o to H.P bisects the axis of the cone. Draw the development of the lateral surface of the truncated cone.

UNIT–V

9. Draw an isometric projection of
   i) A Square plane of side 40mm
   ii) A rectangular plane 60mmX80mm. Both in the horizontal and the vertical plane

OR

10. Draw the isometric projection of a circle of diameter 50mm with its plane horizontal and vertical.

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