R-14

Code: 4G511

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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 = 70Marks)
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UNIT–I

1. a) Explain the laws of superposition and transmissibility   4M

    b) State and prove Varignon's theorem   10M

OR

2. a) Explain different types of loads acting on a beam   4M

    b) Find the reactions of supports of a simple beam subjected to a transverse load
        varying uniformly from 'zero' at end A to 'w' at end B.   10M

UNIT–II

3. a) What is meant by a truss and a perfect frame?   4M

    b) Find the forces in all the members of the pin jointed truss shown in Figure-1 by
        the method of joints.

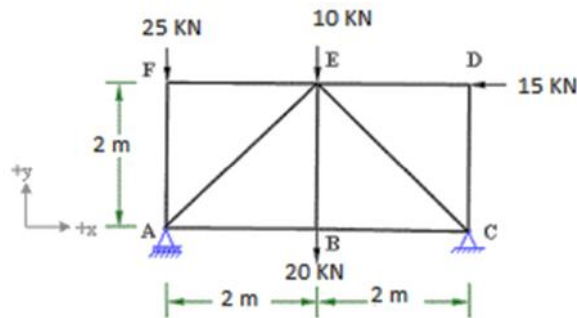Figure-1   10M

OR

4. a) What are the assumptions for analyzing a planar truss?   4M

    b) Find the forces in the members AE, BE and CE of the truss shown in Figure-1
        by the method of sections.   10M

UNIT–III

5. a) What are the coulomb's laws of friction?   4M

    b) Two blocks of weights W_1 and W_2 rest on a rough inclined plane and are connected
        by a short piece of string (block-1 below the block-2). If the coefficients of friction
        are $\mu_1 = 0.2$ and $\mu_2 = 0.3$, respectively, find the angle of inclination of the plane for
        which sliding will impend.   10M

OR

6. a) Differentiate between static and dynamic frictions.   4M

    b) A ladder AB of length '*l*' is supported by a horizontal floor at A and by a vertical
        wall at B and makes an angle ' ' with the horizontal. Find the maximum distance
        'x' up the ladder from its base, at which a man of weight 'W' can stand without
        causing slipping to occur, if the angle of friction between floor and ladder and
        between wall and ladder is ' '. Neglect the weight of the ladder itself.   10M

UNIT–IV

7. a) What is the difference between centre of gravity and centroid? 4M

   b) Determine the coordinates x_c and y_c of centroid C of
      (i) an arc of quadrant of a circle of radius 'r'
      (ii) an area of quadrant of a circle of radius 'r' 10M

OR

8. a) Explain parallel axis theorem and perpendicular axis theorem of M.I. 4M

   b) Calculate the moments of inertia about the centroidal axes of the area of an angle section having overall dimensions of 40 mm X 40 mm with thickness of each leg equal to 10 mm. 10M

UNIT–V

9. a) State and prove Work-Energy principle of rectilinear translation. 7M

   b) When a ball of weight 'W' rests on a spring of constant 'k', it produces a static deflection of 25 mm. How much will the same ball compress the spring if it is dropped from a height h = 300 mm? Neglect the mass of the spring. 7M

OR

10. a) Explain Virtual work principle and D'Alembert's principle with an example. 7M

    b) A homogeneous sphere, of radius a = 0.25 m and weight W = 1 KN, can rotate freely about a diameter. If it starts from rest and gains, with constant angular acceleration, an angular speed of n = 180 rpm in 12 revolutions, find the acting moment 'M'. 7M

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R-14

Code: 4GC13

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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) Comment on impurities of water and mention the units of hardness in detail.   7M
    b) Calculate the temporary and permanent hardness of water sample containing
        $Mg(HCO_3)_2$=7.3mg/L, $Ca(HCO_3)_2$=16.2mg/L, $MgCl_2$= 9.5mg/L, $CaSO_4$=13.6mg/L)   7M

OR

2. a) Write any two internal treatment methods for industrial water purification.   7M
    b) Explain Ion-Exchange process in detail.   7M

UNIT–II

3. a) What are fuel cells? Write the working procedure for H_2-O_2 fuel cell   7M
    b) Write a note on lead-acid batteries with chemical reactions involving.   7M

OR

4. a) Explain any two methods for prevention of corrosions.   7M
    b) Explain the factors which effect the corrosion.   7M

UNIT–III

5. a) Write the engineering applications of Bakelite and nylon-6,6.   7M
    b) Explain the preparation, properties and applications of Buna-N rubber.   7M

OR

6. a) Write the synthesis and applications of polyacetylene and polyanline.   7M
    b) Comment on the role of biodegradable polymers in present scenario.   7M

UNIT–IV

7. a) Determine the calorific value of a fuel by using bomb calorimeter.   7M
    b) Write a note on synthesis of petrol from Fischer Tropsch's synthesis.   7M

OR

8. a) What is power alcohol? Mention the advantages and disadvantages of power
        alcohol.   7M
    b) Comment on the following
        i) Producer gas   **ii)** Water gas   **iii)** Biogas   7M

UNIT–V

9. a) What is the composition of Portland cement? Explain setting and hardening of it   7M
    b) Comment on refractories   7M

OR

10. a) What are the properties of lubricants? Explain the theory of lubrication.   7M
    b) Write any seven applications of refractories.   7M

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Code: 4GC12

R-14

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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) Explain the Interference due to thin films and draw the conditions for constructive and destructive Interference.   10M

   b) A parallel beam of light of wavelength 5890 A^o is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction in to the plate is 60°. Calculate the smallest thick ness of the glass plate which will appear dark by reflection.   4M

OR

2. a) Describe the construction and working of He-Ne laser with energy level diagram   10M

   b) Derive an expression for numerical aperture of an optical fiber and calculate acceptance angle of an optical fiber if the refractive index of core and cladding are 1.623 and 1.522 respectively.   4M

UNIT–II

3. a) What are the miller indices? How they are obtained?   4M

   b) Describe the powder method of determination of crystal system.   7M

   c) Copper has fcc structure and the atomic radius is 0.1278 nm. Calculate the inter planar spacing of (110) and (212) planes.   3M

OR

4. a) What are the properties of Ultrasonics? How do you produce Ultrasonics by Piezo electric oscillator method   10M

   b) Calculate the frequency of the fundamental note emitted by Piezo-electric crystal. Use the following data:

   vibrating length = 3mm, Youngs modulus = 8×10^{10} N/m^2 and density of the crystal= 2.5 gm/cm^3.   4M

UNIT–III

5. a) Give an account of Heisenberg's uncertainty principle. Outline an idealized experiment to bring out its significance.   10M

   b) Write down the Schrodinger time independent wave equation for matter waves. Calculate energy levels of a particle confined in an infinite potential well.   4M

OR

6. a) Discuss the Kronig-Penny model for the motion of an electron in a periodic potential.   10M

   b) Find the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-4} Ohm-m, if the metal has 5.8×10^{28} conduction electrons per m^3 4M

UNIT–IV

7. a) Write the principle, working of the P-N junction diode.   7M
    b) Explain the construction and working of
        (i) LED
        (ii) Photo diode   7M

OR

8. a) Define Magnetic moment. Explain the origin of magnetic moment at the atomic field.   5M
    b) Write short notes on
        (i) Ferromagnetic materials
        (ii) Ferrites.   6M
    c) What are the applications of Ferrites   3M

UNIT–V

9. a) What are cooper pairs? How they produce super conductivity in materials.   5M
    b) Explain Type I and Type II super conductors   5M
    c) The Transition temperature for lead is 8.7 K. The maximum critical field for the material is 6×10^5 A/m. Lead has to be used as a super conductor subjected to a magnetic field of 3×10^6 A/m   4M

OR

10. a) Write the properties of Carbon nanotubes   8M
    b) Write any four applications of Nanomaterials   6M

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Code: 4GC14

R-14

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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) Solve the differential equation $(1+y^2)dx = (\tan^{-1}y - x)dy$ 7M

    b) Find the solution for the differential equation $x\frac{dy}{dx} + y = x^3 y^6$ 7M

OR

2. a) Solve the differential equation $(1+y^2)dx + (x - e^{-\tan^{-1}y})dy = 0$ 7M

    b) The rate at which the bacteria multiply is proportional to the instantaneous number present. If the original number doubles in 2 hours, in how many hours will it triple?   7M

UNIT–II

3. Verify Rolle's Theorem for the function $f(x) = x(x+3)e^{-x/2}$ in $[-3,0]$ and find the value of C   14M

OR

4. Using Taylor's theorem, express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of (x-1).   14M

UNIT–III

5. a) Evaluate $\iint \frac{r\,dr\,d\theta}{\sqrt{a^2+r^2}}$ over one loop of the lemniscate $r^2 = a^2\cos 2\theta$ 7M

    b) Evaluate $\iint r^3\,dr\,d\theta$ over the area bounded between the circles $r = 2\cos\theta$ and $r = 4\cos\theta$ 7M

OR

6. a) Evaluate the integral by changing the order of integration $\int_0^\infty \int_0^\infty \frac{e^{-y}}{y}\,dy\,dx$ 7M

    b) By changing the order of integration, evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2\,dy\,dx$ 7M

UNIT–IV

7. a) Find the Laplace transform of

    i) $\left\{\frac{\sin 3t.\cos t}{t}\right\}$.   ii) $\{t^2\sin 2t\}$.   7M

    b) Find $L^{-1}\left\{\frac{s^2}{(s^2+4)(s^2+9)}\right\}$ Using Convolution theorem.   7M

OR

8. a) Find the Laplace Transform of $\left\{\left(\sqrt{t} - \frac{1}{\sqrt{t}}\right)^3\right\}$ 7M

    b) Find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$ Using Convolution theorem.   7M

UNIT–V

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

    b) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the point (1, 2,–1)   7M

OR

10. Using divergence theorem Prove that

    i) $\int_S \bar{R}.\,d\bar{s} = 3V$ ii) $\int_S \nabla r^2\,d\bar{s} = 6V$

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R-14

Code: 4G113

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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 = 70Marks)
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UNIT–I

1. a) What are computing environments?   7M
    b) Discuss tokens in C with examples.   7M

OR

2. a) What is an algorithm and flow chart and what is the need of these? 5M
    b) Draw the flow chart and write the algorithm to find the given number is prime or not. 9M

UNIT–II

3. a) Discuss operator precedence and associatively in C.   7M
    b) Explain with examples, Bitwise shift operators.   7M

OR

4. a) What is a String? List and explain various string handling functions in C. 9M
    b) How single dimensional arrays and multidimensional arrays are declared and initialized? Explain with suitable examples. 5M

UNIT–III

5. a) Write a C program to swap the elements using pointers and functions. 6M
    b) What is the difference between local scope and global scope? How C permits them. 8M

OR

6. a) Why function declaration and function definition have to be differentiated. 5M
    b) What are command line arguments? Write a C program using command line arguments which finds the maximum, minimum and sum of four numbers. 9M

UNIT–IV

7. a) Briefly explain how to pass structures to functions with example. 8M
    b) Explain about selection sort with suitable example.   6M

OR

8. a) Write a C program to search an element in a list using binary search. 7M
    b) Explain about File opening functions.   7M

UNIT–V

9. a) Discuss the implementation of stacks using arrays.   7M
    b) Write the algorithm for converting infix expression to postfix expression. And illustrate each step for the following expression:
        $(m +n)*(k + p) / (g/h) \wedge (a \wedge b/c)$ 7M

OR

10.   Explain the basic operations on circular queues with examples. Also write the procedure for the same. 14M

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Code: 4G512

R-14

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Graphics
(Common to CE and 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 a) A flower bed in a botanical garden is elliptical in shape. Major and minor axes are 9m and 5.5m respectively. Draw the profile of the flower bed to a scale of 1:100 (by Concentric circles method)   8M

   b) Draw the involute of a regular square of side 30mm   6M

OR

2 a) A line AB, 80mm long has its end A 10mm above H.P. and 20mm in front of V.P. Its plan has a length of 45mm. Draw its projections and find the inclination of the line with H.P.   7M

   b) Two pegs fixed on a wall are 5m apart. The distance between the pegs measured parallel to the floor is 4.1m. If one peg is 1.8m above the floor, find the height of the second peg and the inclination of the line joining the two pegs, with the floor.   7M

UNIT–II

3   The ends A,B,C of three rods are resting on the ground. The other ends meet at O,60mm above the ground. The top view of the assembly consists of three lines of lengths 50mm,40mm and 30mm.The 50mm line makes 30^0 with the horizontal. Angle between 50mm and 30mm lines is 100^0 .The 40mm line is further displaced by 120^0 from 30mm line. Draw the projections of the assembly and find the true length and true inclination of each rod with the ground.   14M

OR

4   A hexagonal plate of side 20mm rests on the HP on one of its sides inclined at 45^0 to the VP. The surface of the plate makes an angle of 30^0 with the HP. Draw the front and top view of the plate.   14M

UNIT–III

5   A pentagonal prism ,base 25mm side and axis 50 mm, is resting on one of the corners of its base on the HP. The longer edge containing that corner is inclined at 45^0 to the base. The axis of the prism makes an angle of 30^0 to the V.P. Draw the projections of the solid.   14M

OR

6   A cylinder of diameter 40mm and height 60mm rests on its base on the HP. It is cut by a plane perpendicular to the VP and inclined at 30^0 to the HP. The plane bisects the axis. Draw the front view, sectional top view, end view and true shape of the section.   14M

UNIT–IV

7   A pentagonal prism of base side 25mm and height 60mm stands on one of its ends on the HP with a rectangular face parallel to the VP. A hole of diameter 30mm is drilled centrally through the prism in such a way that the axis of the hole bisects the axis of the prism at right angles. The axis of the hole is perpendicular to the VP. Draw the development of the lateral surfaces of the prism.   14M

OR

8   A vertical square prism of base 50 side is penetrated by a horizontal square prism of base side 40 such that the axes intersect. The axis of horizontal prism is parallel to VP and the faces of both prisms are equally inclined to VP. Draw the projections of the two prisms showing the lines of intersection.   14M
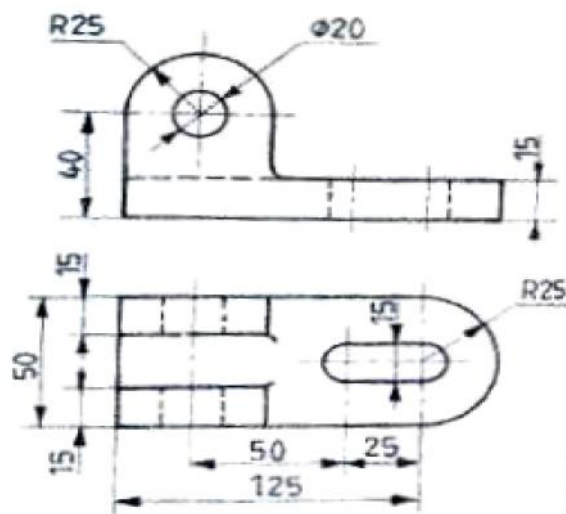
UNIT–V

9   Draw the Front View, Top View, Left Side View of the following object.
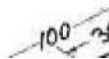
14M

OR

10   Draw the isometric view of the following figures.

14M