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R-14

Code: 4GC12

B.Tech. I Year Supplementary Examinations May/June 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)

UNIT-I

1. a) Describe in detail Fraunhofer diffraction due to a single slit and obtain the conditions for Principal maxima, minimum and secondary maximum. Using this draw the intensity distribution curve. 10M
- b) How many orders will be visible with the wavelength of incident radiation is 7500 \AA and the number of lines on the grating is 2500 in one inch. 2M
- c) What are the characteristics of laser? 2M

OR

2. a) Explain the principle of an optical fiber. 3M
- b) Derive an expression for acceptance angle for an optical fiber? How it is related to numerical aperture. 4M
- c) Draw the block diagrams of fiber optic communication system and explain the function of each block. 7M

UNIT-II

3. a) Elucidate the Simple Cubic (SC), Face Centered Cubic (FCC) and Body Centered Cubic (BCC) crystal structures. 6M
- b) Briefly explain about edge and screw dislocations. 4M
- c) Describe how the ultrasonics are used in non-destructive testing of material. 4M

OR

4. a) Explain the terms
(i) Space lattice
(ii) Unit cell
(iii) Bravais lattice 6M
- b) Explain the significance of Burger's vector. 2M
- c) Describe the production of ultrasonics by using piezoelectric method with suitable diagram. 6M

UNIT-III

5. a) What are matter waves? Explain their properties. 3M
- b) Deduce Schrödinger's time independent wave equation and give the physical significance of wave function. 6M
- c) Explain the origin of energy bands in solids. 5M

OR

6. a) What is de-Broglie hypothesis? Show that the wavelength associated with an electron of mass "m" and kinetic energy 'E' given by $\lambda = h/\sqrt{2mE}$ where 'h' is Planck's constant. 4M
- b) Discuss the postulates of classical free electron theory of metals. 3M
- c) Discuss the Kronig penny model for the motion of an electron in a periodic potential. 7M

UNIT-IV

7. a) Write a note on Intrinsic and extrinsic semiconductors. 4M
- b) Explain Hall effect and its application. 4M
- c) Describe the drift and diffusion currents in a semiconductor? Derive their expressions. 6M

OR

8. a) How materials are classified as dia or para or ferro - magnetic? Explain. 5M
- b) Distinguish between hard and soft magnetic materials. 3M
- c) Explain about direct and indirect band gap semiconductors. 6M

UNIT-V

9. a) Define superconductivity and mention its properties. 4M
- b) Describe the BCS theory of superconductivity? Describe how cooper pairs are formed. 6M
- c) Explain any four applications of super superconductors in detail. 4M

OR

- 10 a) What are nanomaterials? Explain why the properties of nanoparticles are different 5M
- b) Describe the process of "sol-gel, chemical vapor deposition and thermal evaporation in the fabrication of nanomaterials. 9M

Hall Ticket Number :

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R-14

Code: 4GC13

B.Tech. I Year Supplementary Examinations May/June 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)

UNIT-I

1. a) What is hardness of water? Mention its units. Calculate the carbonate and non carbonate hardness of a sample of water contains the following salts per litre.
 $Mg(HCO_3)_2 = 7.3$ mg, $Ca(HCO_3)_2 = 16.2$ mg, $MgCl_2 = 9.5$ mg, $CaSO_4 = 13.6$ mg. 7M
- b) Describe the desalination process by reverse osmosis with a neat sketch 7M

OR

2. What are boiler troubles? How are they caused? Give suggestions to minimize the troubles. 14M

UNIT-II

3. a) Differentiate between cathodic protection and anodic protection 8M
- b) What is the emf of the following cell at 25°C
 $Zn(s)/Zn^{++}(0.1M) || Cu^{++}(1.75M)/Cu(s)$. The standard emf of the cell is 1.1 V 6M

OR

4. Define fuel cell. Explain the construction and working of H_2-O_2 fuel cell. What are the advantages and limitations of fuel cell? Write the reactions involved. Why is water formed in this cell removed continuously? 14M

UNIT-III

5. What are silicones? Give preparation, properties and applications of silicones 14M

OR

6. Give an account of preparation, properties and engineering uses of the following
- (i) Bakelite 4M
 - (ii) PVC 4M
 - (iii) Styrene rubber 3M
 - (iv) Nitrile rubber 3M

UNIT-IV

7. What are the characteristics of metallurgical coke? Describe the manufacture for metallurgical coke by Otto-Hoffmann's method 14M

OR

8. a) With a neat diagram describe the Orsat's gas analysis method. 10M
- b) Define calorific value of a fuel. Distinguish gross and net calorific value of fuel. 4M

UNIT-V

9. What are rocket propellants? How are they classified? What are the requirements for the selection of a good propellant? 14M

OR

10. What is the composition of Portland cement? Explain how Portland cement is manufactured by wet process, with the help of chemical reactions involved in it 14M

Code: 4G511

B.Tech. I Year Supplementary Examinations May/June 2016

Engineering Mechanics

(Common to CE and ME)

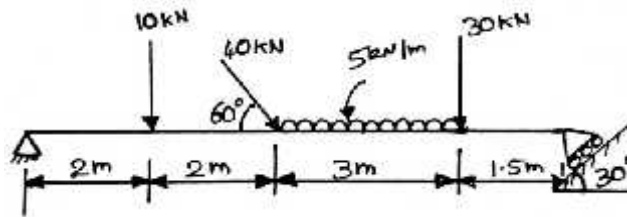
Max. Marks: 70

Time: 3 Hours

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

UNIT-I

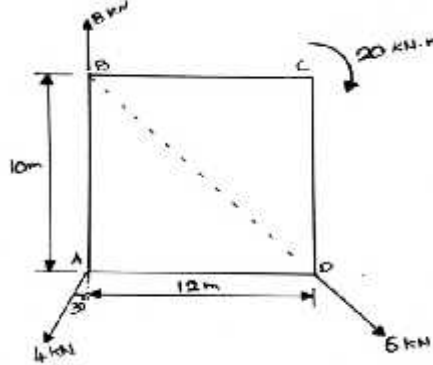
1. The beam of AB 8.5 m long is hinged at A and is supported on rollers at B. The plane of rollers is inclined at 30° to the horizontal. Find the reactions of A & B if the loads on it are as shown in figure.



14M

OR

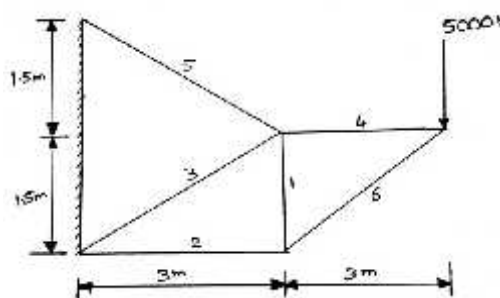
2. Find the magnitude, direction and position of resultant force of a system of forces shown in figure with respect to point A



14M

UNIT-II

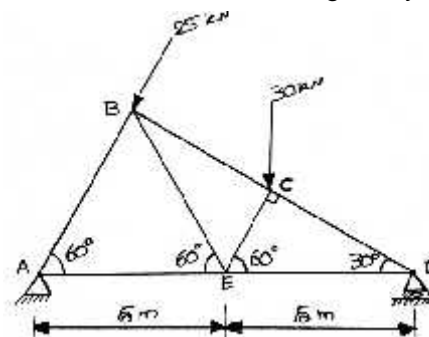
3. a) What are the assumptions made in the analysis of a simple truss? 4M
b) Using method of sections find the axial force in each of members 1, 2 and 3 of the plane truss shown in figure.



10M

OR

4. Find the forces in the members of the truss shown in figure by the method of joints.



14M

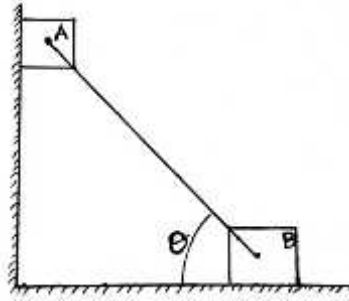
UNIT-III

5. A 7m long ladder rests against a vertical wall, with which it makes an angle of 45° , and on a floor. If a man, whose weight is one half of that of the ladder, climbs it. At what distance along the ladder will he be, when the ladder is about to slip? The coefficient of friction between the ladder and the wall is $1/3$ and that between the ladder and the floor is $1/2$.

14M

OR

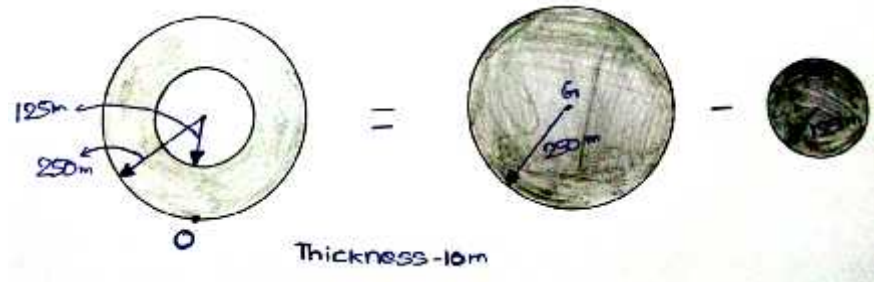
6. Two identical blocks A and B are connected by a rod and rest against vertical and horizontal planes respectively as shown in figure. If sliding impends when $\theta = 45^\circ$, determine the coefficient of friction μ , assuming it to be the same at both floor and wall.



14M

UNIT-IV

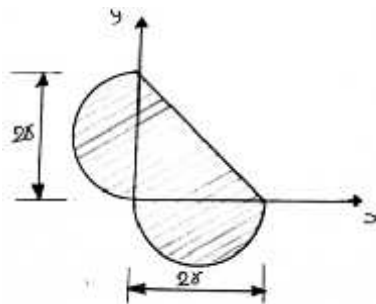
7. If the plate shown in figure has a density of 8000 kg/m^3 and a thickness of a 10 mm, determine its mass moment of inertia about an axis directed perpendicular to the page and passing through point O.



14M

OR

8. Determine the moment of inertia and radius of gyration with respect to x and y axis.



14M

UNIT-V

9. a) State and prove D'Alembert's principle. 8M
b) What is the difference between kinetics and kinematics? 6M

OR

10. A small block of weight W rests on a horizontal turn table at a distance $r=1\text{m}$ from the centre of the turn table. Find the maximum uniform speed of the block, can have without slipping off the table. Assume the coefficient of friction between block and the turn of the table to be 0.5.

14M

Code: 4G512

B.Tech. I Year Supplementary Examinations May/June 2016

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)

UNIT-I

- The distance between two fixed points is 100 mm. A point moves in a plane such that the sum of its distances from the two fixed points is always 130mm. trace the complete path of the moving point. Name the curve.

OR

- Draw the involute of a circle of 40mm diameter. Draw a tangent at a distance of 80mm from the center of the circle.

UNIT-II

- Draw the projections of a straight line 90mm long when its ends are 50mm & 20mm above H.P. and 40mm & 10mm respectively in front of V.P. Determine its inclination with H.P.

OR

- A circle of 60mm dia rests on a point A of its circumference on the ground. Its plane is inclined at 45° to the ground. The top view of the diameter AB makes an angle of 30° with XY, draw its projections.

UNIT-III

- A square pyramid, base 35mm side and axis 50mm long, has a triangular face in the V.P., the front view of the axis making an angle of 30° to XY. Draw its projections.

OR

- A hexagonal prism (base 35mm side & axis 60mm long) is resting on one of its base edges in the H.P. but inclined at 30° to V.P., and the axis inclined at 45° to H.P. Draw its projections.

UNIT-IV

- A cone base 50mm dia, 65mm long axis, is cut by a plane inclined at 45° to the base but passing through the mid-point on the axis. Develop the lateral surface of the solid.

OR

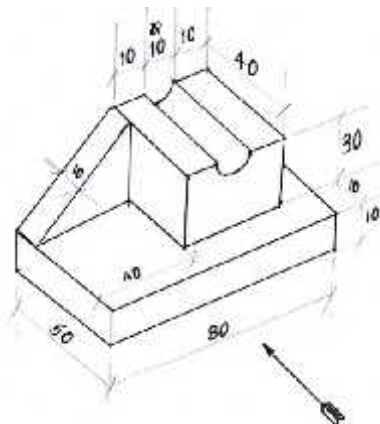
- A vertical cylinder, base 60mm dia & axis 75mm long, is penetrated by a horizontal cylinder, base 40mm dia & axis 60mm long, axes of both the solids bisecting each other. Draw the projections of the solids when the plane containing the axes is parallel to V.P.

UNIT-V

- A square pyramid, base 30mm side & axis 45mm long, is centrally placed on the top surface of a vertical square prism, base 50mm side & axis 75mm long. Bases sides of both the solids are parallel to one another. Draw the isometric view of the combination of the solids.

OR

- Draw the front view, top view & left side view of the solid shown in the figure.



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)

UNIT-I

1. a) Find the orthogonal trajectories of the family of curves $r^n = a^n \cos n\theta$ 7M
- b) Solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$ by the method of variation of parameters 7M

OR

2. a) If the temperature of a cup of coffee is 92°C when freshly poured in a room having temperature 24°C. In one minute it was cooled to 80°C. How long a period must elapse before the temperature of the cup becomes 65°C? 6M
- b) Solve $(D^3 + 1)y = e^{-x} + \cos(2x - 1)$ 8M

UNIT-II

3. a) Verify Rolle' theorem for $f(x) = e^{-x} \sin x$ in $[0, f]$. 8M
- b) If $u = x + y + z, uv = y + z, uvw = z$, then prove that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$ 6M

OR

4. a) Verify the Meclaurin's theorem for $f(x) = (1-x)^{\frac{5}{2}}$ with Lagrange's form of remainder up to 3 terms with $x=1$. 7M
- b) Discuss the maxima and minima of $f(x, y) = x^3 y^2 (1-x-y)$. 7M

UNIT-III

5. a) Trace the curve $y^2(2a-x) = x^3$ 7M
- b) Evaluate $\iint r \sin \theta \, dr d\theta$ over the cardioids $r = a(1 - \cos \theta)$ above the initial line. 7M

OR

6. Change of order of integration and hence evaluate the double integral $\int_0^1 \int_{x^2}^{2-x} xy \, dx dy$ 14M

UNIT-IV

7. a) Evaluate $L\{te^{3t} \sin 2t\}$ 4M
- b) Find the Laplace transform of periodic function $f(t) = \begin{cases} 1, & 0 < t < a/2 \\ -1, & a/2 < t < a \end{cases}$ And $f(t+a) = f(t)$. 10M

OR

8. Solve $y'' + 2y' + 5y = e^{-t}$, $y(0) = 0$, $y'(0) = 1$ using Laplace transform technique. 14M

UNIT-V

9. a) Find the directional derivative of $2xy + z^2$ at $(1, -1, 3)$ in the direction of $\bar{i} + 2\bar{j} + 3\bar{k}$. 7M
- b) Prove that $\text{div} \left(\frac{\bar{r}}{r} \right) = \frac{2}{r}$, where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ and $r = |\bar{r}|$ 7M

OR

10. Verify Gauss divergence theorem for $\bar{F} = (x^3 - yz)\bar{i} - 2x^2y\bar{j} + z\bar{k}$ taken over the surface of cube bounded by the planes $x=y=z=a$ & $x=y=z=0$. 14M

Code: 4G113*B.Tech. I Year Supplementary Examinations May/June 2016***Programming in C and Introduction to Datastructures**

(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)

UNIT-I

1. a) Differentiate high level language, assembly level language and machine level language 7M
- b) Define Flow chart. List some commonly used symbols and specify its purpose 7M

OR

2. a) Explain memory allocation for constant. How to assign range of values in 'C' Data types? 7M
- b) Define identifier. List the rules for identifier. Give valid and invalid examples 7M

UNIT-II

3. a) Define Array? Write the declaration of Multi Dimensional Array 7M
- b) Differentiate between while loop and do while loop 7M

OR

4. a) Give examples for postfix, prefix, unary and binary expressions. 7M
- b) Write a C program to check whether a given number is Armstrong number or not. 7M

UNIT-III

5. a) Write a C program to find GCD of two numbers using recursion 7M
- b) Describe the steps in writing a function in a C program? 7M

OR

6. a) Describe dynamic memory allocation functions 7M
- b) Define Function. Explain how to define User-Defined Functions. 7M

UNIT-IV

7. a) Write a program in C to copy the contents of one file to another file 7M
- b) Explain the functions supported to perform read operation on file 7M

OR

8. a) Write a program in C to merge two files into another file 7M
- b) Explain with an example how to pass structure variable as argument by value and by reference 7M

UNIT-V

9. a) Write the procedure for evaluation of postfix expression 7M
- b) Write a program in C to implement the insert and delete operation of queue using arrays/sequential representation 7M

OR

10. a) Discuss the procedure to convert infix expression to postfix expression 7M
- b) Write a program in C to implement the push and pop operation of Stack using arrays/sequential representation 7M
