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Code: 4GC13

B.Tech. I Year Supplementary Examinations December 2017

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 the principle of EDTA titration? Briefly describe the estimate of hardness of water by EDTA method. 10M
- b) What are the advantages of break-point chlorination? 4M

OR

2. a) Explain the boiler troubles, scale and caustic embrittlement in details. 8M
- b) Why is calgon conditioning better than phosphate conditioning? 6M

UNIT-II

3. a) How is NICAD battery constructed? Explain with cell reaction. 7M
- b) Write a brief note on H₂-O₂ fuel cell. 7M

OR

4. a) Discuss the mechanism of chemical and electrochemical corrosion. 7M
- b) Write a brief note on cathodic protection methods. 7M

UNIT-III

5. a) What is synthetic rubber? Is vulcanization essential for all synthetic rubbers? 7M
- b) Distinguish thermoplastics and thermosetting plastics. 7M

OR

6. a) Discuss the preparation, properties and uses of Buna-S rubbers. 7M
- b) What are conducting polymers? Discuss possible categories of conducting polymers with suitable examples. 7M

UNIT-IV

7. a) Calculate the gross and net calorific values of coal having the following compositions, carbon = 85%, hydrogen = 8 %, Sulphur = 1 %, nitrogen = 2 %, ash = 4 %, latent heat of steam = 587 cal/gm. 6M
- b) Describe the Otto-Hoffman method of coke manufacture and the recovery of various by product. 8M

OR

8. a) What is synthetic petrol? How is it manufactured by Bergius process? 7M
- b) With a neat diagram explain the analysis of flue gas by Orsat apparatus and mention the precautions to be followed during the analysis. 8M

UNIT-V

9. a) Explain the different raw materials and mixing of the raw materials by the dry process during the manufacture of cement. 7M
- b) What are Refractories? Explain Thermal spalling, strength and porosity of the refractories. 7M

OR

10. a) Write short notes on the following properties of lubricants:
- (i) Cloud and Pour point
- (ii) Flash and Fire point. 7M
- b) Explain the classification of explosive.
- (i) Primary or initiating explosives,
- (ii) Low explosives or propellants. 7M

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R-14

Code: 4G513

B.Tech. I Year Supplementary Examinations December 2017

Engineering Drawing

(Common to EEE, ECE, CSE and IT)

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) Draw a parabola when the distance between its focus and directrix is 50mm. Also draw a tangent and a normal at a point 70mm from the directrix. 7M
- b) Draw an ellipse having major axis is equal to 100 mm and the minor axis is equal to 70 mm by using concentric circle method. 7M

OR

- 2. Draw an epi-cycloid of rolling circle of diameter 40 mm which rolls outside another circle (base circle) of 150 mm diameter for one revolution. Draw a tangent and normal at any point on the curve. 14M

UNIT-II

- 3. a) Draw the projections of the following points, keeping the distance between the projectors as 25mm on the same reference lines.
A – 20mm above HP and 30mm in front of VP
B – 20mm above HP and 30mm behind VP
C – 20mm below HP and 30mm behind VP
D – 20mm below HP and 30mm in front of VP 8M
- b) An 80mm long line PQ is inclined at 30 deg to V.P and is parallel to H.P. The end P of the line is 20mm above the H.P and in front of the V.P, draw the projection of the line. 6M

OR

- 4. A line AB, 70mm long, has its end A 15mm above HP and 20mm in front of VP. It is inclined at 30° to HP and 45°to VP. Draw its projections 14M

UNIT-III

- 5. A regular pentagon of 30 mm sides is resting on HP on one of it's sides while it's opposite vertex (corner) is 30 mm above HP. Draw projections when side in HP is 30° inclined to VP. 14M

OR

- 6. a) A Square plane with a 40mm side has it's surface parallel to and 20mm above the HP. Draw It's Projections, when (i) a side is parallel to VP (ii) a side is inclined at 30° to VP and (iii) All sides are equally inclined to VP. 7M
- b) A Pentagonal plane with a 30mm side has an edge on the HP the surface of the Plane is inclined at 45° to the HP. Draw It's Projections? 7M

UNIT-IV

7. a) A Hexagonal Prism having a base with a 30 mm side and 75 mm long axis, has an edge of its base on the HP. Its axis is Parallel to the VP and inclined at 45° to the HP. Draw its projections? 7M
- b) A Square Pyramid, having base with a 40 mm side and 60 mm axis is resting on its base on the HP. Draw its Projections when (i) a side of the is parallel to the VP and (ii) A side of the base is inclined at 30° to the VP 7M

OR

8. A cone 40 mm diameter and 50 mm axis is resting on one generator on HP which makes 30° inclination. Draw its projections? 14M

UNIT-V

9. Figure:1 shows the orthographic projections of a Solid. Draw the Isometric view of the given solid. 14M

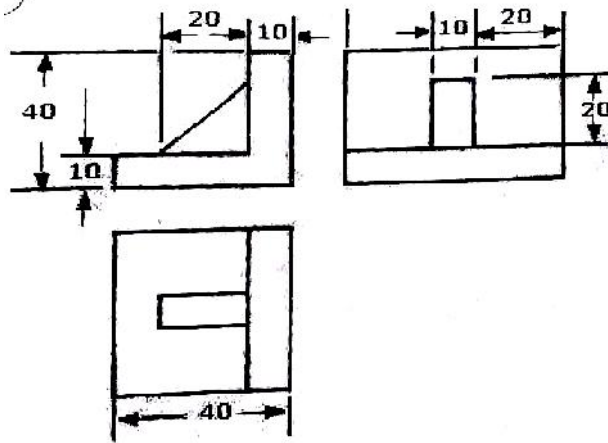


FIG : 1

14M

OR

10. Draw the following views of the object shown pictorially: (i) Front view. (ii) Top view. (iii) Side view.

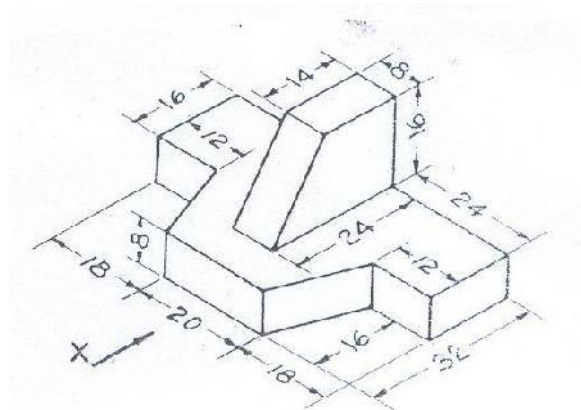


FIG:2

14M

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R-14

Code: 4GC12

B.Tech. I Year Supplementary Examinations December 2017

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) Explain Newton's rings experiment by reflection to calculate the wavelength of a monochromatic light. 5M
- b) Derive Einstein's coefficients in LASERS. 5M
- c) Write the applications of optical fibers in industries and in medical field. 4M

OR

2. a) Give the theory of Fraunhofer diffraction due to single slit. 5M
- b) Explain population inversion. Mention important applications of LASERS 4M
- c) Derive the expression for acceptance angle and Numerical Aperture of an Optical fiber. 5M

UNIT-II

3. a) Derive an expression for inter-planar spacing in cubic system. 5M
- b) Define Miller Indices and mention the steps involved. Sketch (110) & (001) the planes in a cube. 5M
- c) Define point defects? Explain different types of point defects. 4M

OR

4. a) Describe with suitable diagram the Laue method of X-ray diffraction and give the consequences 5M
- b) Explain different types of line defects. How the burger's vector is used to find the edge and screw dislocations? 5M
- c) Write note on production of ultrasonics by piezoelectric method. 4M

UNIT-III

5. a) What are matter waves? Explain their properties. 4M
- b) Show that the energies of a particle in 1-D potential box are quantized. Explain the physical significance of wave function. 7M
- c) Calculate the de Broglie wavelength associated with an electron when it is raised to a potential of 1600 V. 3M

OR

6. a) What are drawbacks of classical free electron theory of metals? How are these are removed by the application of quantum states? 5M
- b) Show that the Kronig - Penney model leads to existence energy bands in solids. 5M
- c) Give the classification of solids into metals, semiconductors and insulators on the basis of band theory of solids. 4M

UNIT-IV

7. a) Describe drift and diffusion currents in a semiconductor. Derive their expressions. 6M
b) Derive the equation of continuity equation for electrons. 5M
c) Draw I-V characteristic curve of a PN junction diode and explain. 3M

OR

8. a) Explain the origin of magnetic moment in atoms. Find the magnetic dipole moment due to orbital and spin motions of an electron. 5M
b) Explain hysteresis of a ferromagnetic materials. 4M
c) Explain the classification of magnetic materials. 5M

UNIT-V

9. a) Explain Meissner effect. Write notes on magnetic levitation. 5M
b) Describe BCS theory of superconductivity. 5M
c) Write applications of superconductors. 4M

OR

10. a) Explain the basic principles of nanomaterials. 5M
b) Describe the process of “sol-gel” and “chemical vapour deposition” method of fabrication of nanomaterials. 6M
c) Write the applications of nanomaterials. 3M

Code: 4GC14

B.Tech. I Year Supplementary Examinations December 2017

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) Solve $xy(1+xy^2)\frac{dy}{dx} = 1$ 7M
 b) A body originally at $80^{\circ}C$ cools down to $60^{\circ}C$ in 20 minutes, the temperature of the air being $40^{\circ}C$. What will be the temperature of the body after 40 minutes from the original? 7M

OR

2. a) Solve $(D^3 - D)y = 2x + 1 + 4\cos x + 2e^x$ 7M
 b) Using the method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$ 7M

UNIT-II

3. a) Verify Rolle's theorem for $f(x) = (x+2)^3(x-3)^4$ in $(-2,3)$ 7M
 b) In a plane triangle, find the maximum value of $\cos A \cos B \cos C$ 7M
- OR**
4. a) Verify Lagrange's mean value theorem for $f(x) = (x-1)(x-2)(x-3)$ in $(0,4)$ 7M
 b) Given $x + y + z = a$, Find the maximum value of $x^m y^n z^p$ 7M

UNIT-III

5. a) Trace the curve $a^2y^2 = x^2(a^2 - x^2)$ 7M
 b) Find the area lying between the parabola $y = 4x - x^2$ and the line $y = x$. 7M
- OR**
6. a) Change the order of integration and evaluate $\int_0^a \int_{x/a}^{\sqrt{x/a}} (x^2 + y^2) dx dy$ 7M
 b) Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x + y + z) dx dy dz$ 7M

UNIT-IV

7. a) Find the Laplace transform of $f(t) = |t-1| + |t+1|$, $t \geq 0$ 7M
 b) Apply convolution theorem to evaluate $L^{-1}\left(\frac{s^2}{(s^2 + a^2)(s^2 + b^2)}\right)$ 7M

OR

8. Solve $\frac{d^2x}{dt^2} + 9x = \cos 2t$, if $x(0) = 1$, $x\left(\frac{f}{2}\right) = -1$ 14M

UNIT-V

9. a) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$ 7M
 b) Evaluate $\int_S F \cdot ds$ where $F = 4xI - 2y^2J + z^2K$ and S is the surface bounding the region $x^2 + y^2 = 4$, $z = 0$ and $z = 3$ 7M

OR

10. Verify Green's theorem for $\int_C (xy + y^2)dx + x^2dy$, where C is bounded by $y = x$ and $y = x^2$ 14M

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Code: 4G111

B.Tech. I Year Supplementary Examinations December 2017

Programming in C and Data Structures

(Common to CSE and IT)

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) Explain SDLC process and need of it. 7M
 b) Explain different classification of computer systems 7M

OR

2. a) What is a constant? Explain the different types of constants in C. 7M
 b) Describe standard C input and output functions with suitable C program. 7M

UNIT-II

3. a) Explain with examples, logical bitwise operators. 7M
 b) What are pre-test and post-test loops? Explain them with examples. 7M

OR

4. Write a program to read 3x3 matrix elements and print the sum of diagonal elements. 14M

UNIT-III

5. a) Compare call by value and call by reference parameter passing techniques when parameters are of basic data type and array. 7M
 b) Explain about storage classes. 7M

OR

6. a) Write a C program to find the second maximum among the array of elements. 9M
 b) What are the advantages and disadvantages of recursion? 5M

UNIT-IV

7. a) What is a structure? Explain how to declare, initialize and access the structure elements. 7M
 b) Differentiate between text and binary files. 7M

OR

8. a) Write a C program to search for a given element in the integer array using linear search 7M
 b) What do you mean by sorting? Mention the different types of sorting? Give some examples and explain any one in-detail. 7M

UNIT-V

9. a) Discuss the implementation of queues using arrays. 7M
 b) Describe the operations on a stack with examples. 7M

OR

10. a) Give the step wise procedure for performing insertions on doubly linked list with example. 7M
 b) With an example explain the insertion operation on singly linked list. 7M

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R-14

Code: 4GC15

B.Tech. I Year Supplementary Examinations December 2017

Mathematical Methods

(Common to CSE & IT)

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) Show that the equations $x + y + z = -3$, $3x + y - 2z = -2$ and $2x + 4y + 7z = 7$ are inconsistent. 7M

- b) Reduce the matrix to Echelon form and find the rank of $A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$ 7M

OR

2. Find the Eigen values and corresponding Eigen vectors of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ 14M

UNIT-II

3. Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to Canonical form and also specify the matrix of transformation. 14M

OR

4. a) Show that the Eigen values of a Hermitian matrix are real 7M
 b) Show that the Eigen values of Unitary matrix is unit modulus. 7M

UNIT-III

5. a) Find the roots of $x^3 - x - 1 = 0$ using bisection method 7M
 b) Find the real roots of the equation $x^3 - 4x + 1 = 0$ correct to 3 significant figures, by false position method 7M

OR

6. a) The values of $\sin x$ are given below for different values of x . Find $\sin 32^\circ$

x	30°	35°	40°	45°	50°
$y = \sin x$	0.5	0.5736	0.6428	0.7071	0.7600

7M

- b) Given the table of values

x	150	152	154	156
$y = \sqrt{x}$	12.247	12.329	12.410	12.49

Evaluate $\sqrt{155}$ using Lagrange's interpolation formula

7M

UNIT-IV

7. a) Find the least squares parabolic fit $y = a + bx + cx^2$

x	-3	-1	1	3
y	15	5	1	5

7M

- b) Calculate the value $\int_0^1 \frac{x}{1+x} dx$ correct to 3 significant figures taking 6 intervals by Trapezoidal rule

7M

OR

8. a) Given $\frac{dy}{dx} = 1 + xy$, $y = 1$ at $x = 0$ compute $y(0.1)$ correct to 4 decimal places using Taylor series method.

7M

- b) Use Picard's method to approximate y when $x = 0.1$, $x = 0.2$ for

$$\frac{dy}{dx} = x + y^2 \text{ where } y = 0 \text{ at } x = 0$$

7M

UNIT-V

9. Expand $x \sin x$ in a Fourier series in $(0, 2\pi)$

14M

OR

10. a) Solve $x(y-z)p + y(z-x)q = z(x-y)$

7M

- b) Solve the equation $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + \dots$, where $u(x, 0) = 6e^{-3x}$

7M
