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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
 $Zn(s) / Zn^{++} (0.1 M) || Cu^{++} (1.75 M) / Cu(s)$. 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

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: 4G111

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

Programming in C & Datastructures

(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) Explain various kinds of Computer Systems. Explain the differences between them
b) What is an algorithm and flowchart and describe the various symbols in flowchart. Draw a flowchart for adding two numbers

OR

2. a) Explain the structure of a "C" programming language
b) Explain the "C" input and output library functions *printf* and *scanf* with examples.

UNIT-II

3. a) What are the bit-wise operators and give an example for each operator
b) Explain the basic operations on Strings. Write a program to read string from keyboard and display it using character array or pointers.

OR

4. a) Write the syntax for various control statements and give example for each control statement.
b) Write a program for two dimension Matrix reading from keyboard and displaying on the monitor using arrays

UNIT-III

5. a) What is parameter pass by value and pass by reference in functions? Write a program to exchange the values of two variables using functions in both methods
b) What is a pointer and write syntax for pointer declaration. Explain the dynamic memory allocation and give an example for it.

OR

6. a) Explain pointers to functions and command line arguments with examples
b) Write a program to find the substring of a given string using pointers

UNIT-IV

7. a) Explain nested and array of structures.
b) Explain character input and output functions with example programs

OR

8. a) Write and explain selection sort or quick sort program with example
b) Write and Explain binary search method with example

UNIT-V

9. a) Explain infix, prefix and postfix notations. Give an example converting from one form to other forms
b) Write a program for insertion, deletion and searching of an item in the tree data structure.

OR

10. a) Define and Explain Stack and Queue and their operations
b) Explain the difference between queue and circular queues.

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R-14

Code: 4GC15

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

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) Define the following and give one example
 i) Symmetric matrix. ii) Skew-symmetric matrix iii) Orthogonal matrix 6M
 b) Define the rank of the matrix. Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 1 & 2 & 3 \\ 3 & 4 & 7 & 10 \\ 5 & 7 & 11 & 17 \\ 6 & 8 & 13 & 16 \end{bmatrix} \text{ by reducing it to Canonical form.}$$

8M

OR

2. a) Find the values of a and b for which the equations $x + y + z = 6$, $x + 2y + 3z$ and $x + 2y + }z = \sim$ will have i) no solution ii) a unique solution iii) an infinite number of solutions. 7M

- b) Find the matrix M that diagonalises the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ by means of a similarity transformation. Verify your answer. 7M

UNIT-II

3. a) Reduce the quadratic form $2x_1^2 + 6x_2^2 + 2x_3^2 + 8x_1x_3$ to the canonical form by orthogonal transformation. Also find the rank, index, signature and the nature of quadratic form. 7M

- b) Verify that the sum of the eigen values of A equals the trace of A and their product equals $|A|$, for the matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 4 \end{bmatrix}$. 7M

OR

4. a) Define eigen values and eigen vectors of a matrix. 4M

- b) Find the eigen values and eigen vectors of the Matrix $A = \begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$ 10M

UNIT-III

5. a) Find the real root of $x \log_{10} x - 1.2 = 0$ correct to five places of decimal using Regula-Falsi method. 7M
 b) Derive Newton's forward and backward difference interpolation formulae. 7M

OR

6. a) Evaluate $\sqrt{12}$ to four decimal places by Newton-Raphson Method. 7M
 b) Write down the general formula for pth root. Find cube root of 10. 7M

UNIT-IV

7. a) Evaluate $\int_0^2 \frac{1}{1+x^2} dx$ using Trapezoidal rule, Taking $h = 0.25$. 7M
 b) Find the curve $Y = aX + (b/X)$ to the following data.

X	1	2	3	4
Y	-1.51	0.99	3.88	7.66

7M

OR

8. a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y=1$ for $x=0$. Find y approximately for $x=0.1$ by Euler's method. 7M
 b) Find a solution of the set of simultaneous equations
 $\frac{dx}{dt} = xy + t, \frac{dy}{dt} = ty + x$ Subjected to initial conditions $x=1, y=-1, t=0$
 using Taylor's series method. 7M

UNIT-V

9. a) Expand $f(x) = (x-1)^2$ as a Fourier cosine series in $0 < x < 1$ 7M
 b) Find the half range sine series for $f(x) = \left. \begin{array}{l} x, \quad 0 \leq x \leq 1 \\ 2-x, \quad 1 \leq x \leq 2 \end{array} \right\}$ 7M

OR

10. a) Eliminate the arbitrary constants and arbitrary function respectively
 i) $z = (x+a)(y+b)$ ii) $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$ 7M
 b) Find the complete integral of the first order the differential equation
 i) $(p+q)(z - xp - yq) = 1$
 ii) $pqz = p^2(xq + p^2) + q^2(yq + q^2)$ 7M
