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R-15

Code: 5GC12

I B.Tech. I Semester Supplementary Examinations May / June 2019

Engineering Chemistry

(Common to CE, ME, 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) What are ion exchange resins? Explain the ion exchange method of water softening 7M
b) What is hard water? Explain the types of hardness and disadvantage of hard water 7M

OR

2. a) Determine the temporary, permanent & total hardness of a hard water sample containing $\text{Ca}(\text{HCO}_3)_2 = 70.5 \text{ mg/L}$, $\text{Mg}(\text{HCO}_3)_2 = 60.5 \text{ mg/L}$, $\text{MgSO}_4 = 27.6 \text{ mg/L}$, $\text{CaSO}_4 = 52.1 \text{ mg/L}$. 7M
b) Write a note on
(i) Priming and foaming (ii) Scale and sludge formation in boiler 7M

UNIT-II

3. a) Describe the construction and working of lithium ion battery 7M
b) An electrochemical cell consists of an iron electrode, dipped in 0.1M FeSO_4 and silver electrode dipped in 0.05M AgNO_3 solution. Calculate the emf of the cell at 298K. Given SRP of Fe and Ag are -0.44 and +0.8V respectively. 7M

OR

4. a) Discuss the different types of conductometric titrations with examples 7M
b) Explain the construction and working of Hydrogen-Oxygen fuel cell 7M

UNIT-III

5. a) Differentiate between thermoplastics and thermosetting plastics 6M
b) Explain the preparation, properties and applications of PVC and PE 8M

OR

6. a) Write a brief note on Vulcanization and compounding of rubber 8M
b) Explain the preparation, properties and applications of polyphosphazenes 6M

UNIT-IV

7. a) What are chemical fuels? Give the classification of fuels with examples 6M
b) A sample of Coal on analysis was found to contain the following. C=85.0%, $\text{H}_2=5.2\%$, $\text{O}_2 = 4.0\%$, S = 2.1%, $\text{N}_2 = 3.5\%$, and ash = 0.2%. Calculate the quantity of air required for complete combustion of 1 kg of this coal 8M

OR

8. Describe the Otto Hoffmann's method of manufacture of metallurgical coke with a neat labelled diagram. How do you recover the byproducts in this method 14M

UNIT-V

9. a) Describe the essential properties of a good refractory material. 8M
b) Discuss the following properties of lubricants (i) Cloud and pour point (ii) Aniline point 6M

OR

10. a) What is cement? Explain with the help of chemical reaction setting and hardening of cement 7M
b) What is Portland cement? Illustrate the manufacture of Portland cement by dry method with a neat labelled diagram of rotary kiln 7M

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Code: 5GC14

I B.Tech. I Semester Supplementary Examinations May / June 2019

Engineering 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. Solve $x \frac{dy}{dx} + y = x^3 y^6$

OR

2. a) Solve $(1 + y^2)dx = (\tan^{-1} y - x)dy$

b) A bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours

UNIT-II

3. Solve $(D^2 + 4)y = x^2 + \cos 2x$

OR

4. Using the method of variation of parameters, solve $(D^2 + 4)y = \tan 2x$

UNIT-III

5. a) Verify Lagrange's Mean value theorem for $f(x) = e^x$ in $[0,1]$

b) Using Maclaurin's series, expand $f(x) = \log(1+x)$

OR

6. Test for convergence of the series $\frac{1}{2\sqrt{1}} + \frac{x^2}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \frac{x^6}{5\sqrt{4}} + \dots \dots \dots \infty$

UNIT-IV

7. If $u = x^2 - 2y, v = x + y + z, w = x - 2y + 3z$, then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$

OR

8. Find the maximum and minimum values of $x^3 + y^3 - 3axy$

UNIT-V

9. Trace the curve $x = a(\theta + \sin \theta), y = a(1 + \cos \theta)$

OR

10. Trace the curve $r = a \sin 3\theta$

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I B.Tech. I Semester Supplementary Examinations May / June 2019

Mathematical Methods-I

(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) Determine the Rank of the matrix $A = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$
- b) Investigate the values of λ and μ so that the equations $2x+3y+5z=9$, $7x+3y-2z=8$, $2x+3y+\lambda z = \mu$, have (i) no solution, (ii) a unique solution and (iii) an infinite number of solutions.

OR

2. a) By reducing the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix}$ into normal form, find its rank.
- b) Find the values of p and q so that the equations $2x+3y+5z=9$, $7x+3y+2z=8$, $2x+3y+pz=q$ have (i) No solution (ii) Unique solution (iii) An infinite number of solutions.

UNIT-II

3. a) Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and its Inverse. Also express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomial in A.
- b) If λ is Eigen value of an Orthogonal matrix, then $\frac{1}{\lambda}$ is also an Eigen value

OR

4. a) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
- b) If $\lambda_1, \lambda_2, \lambda_3, \dots, \lambda_n$ are the eigen values of a matrix A, then prove that A^2 has the Eigen values $\lambda_1^2, \lambda_2^2, \lambda_3^2, \dots, \lambda_n^2$.

UNIT-III

5. a) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4yz - 10zx + 5xy$ to the canonical form by linear transformation.
- b) Show that the matrix $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is Skew-Hermitian and hence find eigen values and eigen vectors.

OR

6. a) Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form by orthogonal reduction.

- b) Prove that the matrix $\frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 1+i \\ 1-i & -1 \end{bmatrix}$ is Unitary matrix.

UNIT-IV

7. a) Find the real root of equation $x^3 - x - 11 = 0$ by bisection method.
b) Using Newton-Raphson Method, compute $\sqrt{41}$ correct to four decimal places.

OR

8. a) Using the bisection method, find a real root of the equation $\cos x = x e^x$ correct to three decimal places.
b) By using Newton-Raphson method, find the root of $x^3 - x - 2 = 0$.

UNIT-V

9. a) Find $f(2.5)$ using Newton's forward formula from the following table.

x	0	1	2	3	4	5	6
y	0	1	16	81	256	625	1296

- b) From the following table of values of 'x' and 'y', obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=1.5$

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

OR

10. a) Using Lagrange interpolation formula find the value of $f(10)$ from the following table

x	5	6	9	11
y	12	13	14	16

- b) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$, by using (i) Weddle's rule (ii) Simpson's 3/8th rule.

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Code: 5G111

I B.Tech. I Semester Supplementary Examinations May / June 2019

Problem Solving Techniques and Introduction to C Programming

(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 the various problem solving strategies with example. 7M
- b) Write an algorithm to find the greatest number among 3 numbers 7M

OR

2. a) Differentiate between high level and low level language with example 7M
- b) What do you mean by error in a program? Explain the strategies to handle the error. 7M

UNIT-II

3. a) Classify the operators in "C" with example. 7M
- b) Explain the structure of a C program with an example. 7M

OR

4. a) Explain the primitive data types of C with example. 8M
- b) Explain type conversion in c 6M

UNIT-III

5. a) Write a C program to illustrate the working of jump statements break and continue 8M
- b) Explain the "nested if" concept of C by an example. 6M

OR

6. a) Write a C Program to Display Fibonacci Sequence of 8 numbers 7M
- b) Write the concept of "do while" and "while". When to use do while in a program explain with an appropriate example. 7M

UNIT-IV

7. a) Write a C Program to Find the Frequency of Characters in a String 7M
- b) Explain the applications of String with suitable example. 7M

OR

8. a) Write a program to find the smallest number of an integer array. A={34, 45,6, 7,89} 7M
- b) Write a C Program to Copy String Without Using strcpy() 7M

UNIT-V

9. a) Explain various type of qualifiers in C language. Write the importance of "Static" key word. 7M
- b) Write a program using function to design an arithmetical calculator. 7M

OR

10. a) Explain the concept of pre-processor commands. 7M
- b) Write a C Program to Find GCD Using Recursion. 7M

Code: 7GC11

I B.Tech. I Semester Supplementary Examinations May / June 2019

Technical English & Professional Communication

(Common to All Branches)

Max. Marks: 70

Time: 4 Hours

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

UNIT-I

1. a) Why does E.F.Schumacher state that modern technology does not enrich man but empties him?
- b) Fill in the blanks in the following sentences using the hints given in brackets.
- i. He was not happy with her decision. He may _____ with her. (a word with the prefix dis_)
 - ii. He enjoys _____ his friends. (to meet/ meeting)
 - iii. Good sleep is _____ to health. (beneficial/benificial)
 - iv. Rita _____ from the shock of her uncle's death. (Phrasal verb with 'get')
 - v. Anything written in a letter after it is signed is known as _____. (postscript/postdiction)

OR

2. Discuss the different elements of human communication?

UNIT-II

3. a) What are the main ways in which human development has affected climate patterns on the earth?
- b) Write a letter of application in response to an advertisement for the post of Project Manager in a reputed software company.

OR

4. Discuss the different levels of communication.

UNIT-III

5. a) What are the two kinds of technologies currently used to generate solar power on a large scale?
- b) Complete the following sentences with appropriate words chosen from those in brackets:
- i. How many _____ are there in each character in MS Word? (bytes/bites)
 - ii. Students are given an essay about the human _____ in the exam. (soul/sole)
 - iii. We saw a _____ and a tiger when we visited the local zoo. (boar/bore)
 - iv. Our _____ took us through the Alps and then on to Italy. (route / root)
 - v. When it's low _____ you have to walk a long way before you can swim. (tide/tied)

OR

6. Explain the different types of Non-verbal communication in brief?

UNIT-IV

7. a) What are the measures to be taken to prevent soil erosion?
- b) Correct the following sentences
- i. The second innings are going on now
 - ii. Either Ramu or Somu might offer their services.
 - iii. My friend sits besides me in the class
 - iv. Each of the candidates were awarded a certificate.
 - v. One must love his parents.

OR

8. Discuss the different types of listening.

UNIT-V

9. How the idea of 'samskara' is explained in the essay "The Secret of Work"?

OR

10. Write about Linear, Interactive and Transactional communications.

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Code: 5G513

I B.Tech. I Semester Supplementary Examinations May / June 2019

Engineering Drawing-I

(Common to EEE, ECE, 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) Divide a line of 117 mm into i). 9 equal parts ii). 16 equal parts
- b) Construct a triangle of side length 35 mm

OR

2. a) Describe a regular pentagon about a circle of 90 mm diameter.
- b) Draw a tangent to a circle with 45 radius.

UNIT-II

3. Construct a hyperbola, with the distance between the focus and the directrix as 50 and eccentricity as $3/2$. Also draw normal and tangent to the curve point at a point 40 from the directrix.

OR

4. Construct an ellipse of major axis is 90mm and minor axis is 45 mm by Oblong method. Draw a tangent to it at any convenient point.

UNIT-III

5. Construct a hypocycloid, rolling circle of 55 mm diameter and directing circle of 125 mm diameter. Draw a tangent to it at a point 40 mm from the center of directing circle.

OR

6. Draw a hypo-cycloid of a circle of 40 mm diameter, which rolls inside another circle of 160 mm diameter, for one revolution counter clockwise. Draw a tangent and normal to it at a point 65 mm from the center of the directing circle.

UNIT-IV

7. a) A point P is 50 from both the principle planes of projection. Draw its possible projections.
- b) A line AB, 70 mm long, is in the VP and perpendicular to the HP. Draw its projections if the end B is 20 mm above HP.

OR

8. a) Two points P and Q are on HP. The point P being 40 in front of VP, while Q is 50 behind VP. The line joining their top views makes an angle of 45° with XY. Find the horizontal distance between two points.
- b) A line AB, 55 mm long, is perpendicular to the VP and is 45 mm above the HP. Draw its projections if the nearest end is 15 mm in front of the VP.

UNIT-V

9. A line AB, 90 mm long is inclined at 45° to the H.P. and its top view makes an angle of 60° with the V.P. The end A is in the H.P. and 12 mm in front of the VP. Draw its projections and find its true inclination with the V.P.

OR

10. The front view of a 125 mm long line PQ measures 75 mm and its top view measures 100 mm. Its end Q and the mid – point M are in the first quadrant, M being 20 mm from both the planes. Draw the projections of the line PQ.
