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R-15

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations October 2020

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 $x \frac{dy}{dx} + y = x^3 y^6$ 14M

OR

2. A body originally at 80° C cools down to 60° C in 20 minutes, the temperature of the air being 40° C. What will be the temperature of the body after 40 minutes from the original and when will be the temperature be 50° C. 14M

UNIT-II

3. Solve $(D^2 + 4)y = x^2 + \cos 2x$ 14M

OR

4. Using the method of variation of parameters, solve $(D^2 + 4)y = \tan 2x$ 14M

UNIT-III

5. a) Verify Rolle's theorem for $f(x) = \frac{\sin x}{e^x}$ in $(0, f)$ 7M

b) Expand $\sin x$, by using Maclaurin's theorem. 7M

OR

6. a) Verify Lagrange's Mean value theorem for $f(x) = e^x$ in $[0,1]$ 7M

b) Using Maclaurin's series, expand $f(x) = \log(1+x)$ 7M

UNIT-IV

7. If $u = x^2 - 2y, v = x + y + z, w = x - 2y + 3z$, then find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ 14M

OR

8. Find the maximum and minimum values of $x^3 + y^3 - 3axy$ 14M

UNIT-V

9. Trace the curve $r = a(1 - \cos \theta)$ 14M

OR

10. Trace the curve $x^3 + y^3 = 3axy$ 14M

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R-15

Code: 5GC12

I B.Tech. I Semester Supplementary Examinations October 2020

Engineering Chemistry

(Common to CE, ME, 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) What is hardness of water? Mention its units?
b) Describe the desalination process by reverse osmosis with a neat sketch.

OR

2. a) Write a note on internal treatment?
b) What is break point chlorination? State its significance?

UNIT-II

3. What are fuel cells? Describe the working principle of methanol-oxygen fuel cell with reactions.

OR

4. a) What is concentration cell corrosion and galvanic corrosion?
b) Calculate the standard emf of Ni-Ag cell whose E^0_{Ni} and E^0_{Ag} are -0.25 and +0.83 respectively also write cell representation.

UNIT-III

5. a) Distinguish between thermoplastic and thermosetting polymers.
b) Write a note on compounding of rubber?

OR

6. a) Describe doped conducting polymers with suitable example.
b) Write a note on vulcanization of rubber.

UNIT-IV

7. a) Discuss any five characteristics of a good fuel?
b) Classify the fuels with examples?

OR

8. a) Write a note on production and uses of producer gas, water gas and Bio gas.
b) Define knocking? Write about octane number?

UNIT-V

9. a) What are lubricants? Write any three properties and applications of lubricants.
b) What are refractories? Discuss any three properties of refractories?

OR

10. Explain the mechanism of (i) thin film lubrication, (ii) thick film lubrication

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I B.Tech. I Semester Supplementary Examinations October 2020

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) Find the rank of
$$\begin{bmatrix} 1 & 4 & 3 & -2 & 1 \\ -2 & -3 & -1 & 4 & 3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{bmatrix}$$
 7M
- b) Solve the system of equations $x+y+w=0$, $y+z=0$, $x+y+z+w=0$, $x+y+2z=0$ 7M

OR

2. a) Reduce the matrix $\begin{bmatrix} 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ to normal form and hence find the rank 7M
- b) Solve the system of equations $x+2y+3z=1$, $2x+3y+8z=2$, $x+y+z=3$ 7M

UNIT-II

3. a) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ 7M
- b) Show that any square matrix A and its transpose A^t have the same eigen values. 7M

OR

4. a) Verify Caley-Hamilton Theorem for the matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 4 & 3 & 2 \\ 2 & 4 & 3 \end{bmatrix}$ and hence, find A^{-1} . 7M

- b) Determine the modal matrix P for $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ and hence diagonalize A. 7M

UNIT-III

5. a) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4yz - 10zx + 5xy$ to the canonical form by linear transformation. 7M

- 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. 7M

OR

6. a) Define Hermitian, skew-Hermitian, Unitary Matrices and give example for each 7M
- b) Identify the Nature, Index and Signature of the Quadratic form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_1x_3 - 4x_2x_3$ 7M

UNIT-IV

7. a) Find the real root of the equation $x \log_{10} x = 1.2$ by Regular-false method correct to four decimal places. 7M
- b) Find the real root of $f(x) = x^3 - 19$ correct upto three decimal places using Newton-Raphson method. 7M

OR

8. a) Using the bisection method, find a real root of the equation $\cos x = x e^x$ correct to three decimal places. 7M
- b) by using Newton-Raphson method, find the root of $x^3 - x - 2 = 0$. 7M

UNIT-V

9. From the following table, find $e^{1.02}$, using Newton's forward formula.

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

14M

OR

10. From the following table, estimate the number of students who obtained marks between 40 and 45 using Newton's interpolation formula

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

14M

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Code: 5G111

I B.Tech. I Semester Supplementary Examinations October 2020
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) Give a comparison between system and application softwares with examples.
b) Write an algorithm to find the greatest number among the three given numbers.

OR

2. a) Give the block diagram of a computer. Explain functionality of each component.
b) Write an algorithm to calculate the roots of a quadratic equation.

UNIT-II

3. a) What is the need of explicit type conversion in C? How to cast the data?
b) What is an integer constant, floating constant and character constant? Give valid examples.

OR

4. Explain with examples the different types of operators used in C.

UNIT-III

5. a) In what way a do – while loop differs from while loop. Explain.
b) Write a C program to print all the prime numbers between 1 to 100

OR

6. a) How does a switch statement works? List the difference between switch and if else ladder statement.
b) Write a program to demonstrate 'goto' statement.

UNIT-IV

7. a) Write a program to print an array in reverse order
b) Write a C Program to delete 'n' characters in a given string

OR

8. a) What is an Array? Explain different types of Array with examples.
b) What is String? Explain any three string handling functions with examples.

UNIT-V

9. a) What is the scope of variables of type extern, auto, register and static? Explain with example.
b) What is meant by user defined function? Explain with an example C program

OR

10. a) What is a function? What are its advantages? Explain various parameter passing techniques.
b) Write a function that checks whether a given year is leap year or not.

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Code: 5G513

I B.Tech. I Semester Supplementary Examinations October 2020

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) Construct a pentagon of side length 50mm.
- b) Divide a line of length 70mm into 9 equal parts.

OR

2. a) Inscribe a hexagon in a circle of 60mm diameter
- b) Bisect an angle 45°

UNIT-II

3. Construct a parabola when the distance from the focus to directrix is 50mm. Also draw a tangent and normal to the curve at a distance of 40mm from the directrix

OR

4. The length of major axis is 120mm and minor axis is 100mm. Draw an ellipse using Arcs of circles method.

UNIT-III

5. A circle of 50mm diameter rolls on a line for one complete revolution clockwise. Draw a normal and tangent to the curve at a distance of 35mm from the directing line. Name the curve.

OR

6. Draw an epi cycloid for a circle of diameter 40mm which rolls on another circle of 120mm diameter clockwise. Also draw a normal and tangent to the curve at distance of 95mm from the center of the directing circle.

UNIT-IV

7. Draw the projections of the following points on the same ground line, keeping the distance between projectors equal to 25 mm.

(i) Point A, 20 mm above HP, 25 mm behind VP; (ii) Point B, 25 mm below HP, 20 mm behind VP; (iii) Point C, 20 mm below HP, 30 mm in front of VP;

OR

8. A straight line AB of 40 mm length has one of its ends A, at 10 mm from the HP and 15 mm from the VP. Draw the projections of the line if it is parallel to the VP and inclined at 30° to the HP. Assume the line to be located in each of the four quadrants by turns

UNIT-V

9. a) Line AB is 75 mm long and it is 30° & 40° inclined to HP & VP respectively. End A is 12mm above HP and 10 mm in front of VP. Draw projections. Line is in 1st quadrant.
- b) A straight line AB 70mm long has one of its ends 25 mm behind VP and 20 mm below HP. The line is inclined at 30° to HP and 50° to VP. Draw its projections

OR

10. a) A line AB, 50mm long, has its end A in both the H.P. and the V.P. It is inclined at 30° to the H.P. and at 45° to the V.P. Draw its projections
- b) A top view of a 75 mm long line AB measures 65 mm, while the length of its front view is 50 mm. Its l-lie end A is in the H.P. and 12 mm in front of the V.P. Draw the projections of AB and determine its inclination with H.P. and the V.P.
