Code: 19AC11T

I B.Tech. I Semester Supplementary Examinations August 2021

Algebra and Calculus

(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)

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UNIT–I

1. a) Define the rank of the matrix and find the rank of $\begin{bmatrix} 0 & 1 & -3 & 1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ by using Echelon form.   7M

   b) Investigate the values of λ *and* μ so that the equations   7M

      2x+3y+5z=9, 7x+3y-2z=8, 2x+3y+λz = μ , have (i) no solution, (ii) a unique solution and (iii) an infinite number of solutions.

OR

2. Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ 14M

UNIT–II

3. If $A = \begin{bmatrix} 2 & 1 & 2 \\ 5 & 3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$, verify Cayley-Hamilton theorem. Hence find A^{-1} and A^4 .   14M

OR

4. Reduce the Quadratic form $x^2 + 3y^2 + 3z^2 - 2yz$ to a canonical form by an orthogonal transformation and discuss its nature also find the modal matrix.   14M

UNIT–III

5. a) If $U = \log(x^3 + y^3 + z^3 - 3xyz)$ prove that $\left(\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} + \dfrac{\partial}{\partial z}\right)^2 U = \dfrac{-9}{(x+y+z)^2}$ 7M

   b) In a plane triangle, find the maximum value of $\cos A \cos B \cos C$ 7M

OR

6. a) If $x + y + z = u, y + z = uv, z = uvw, then\ evaluate\ \dfrac{\partial(x, y, z)}{\partial(u, v, w)}$ 7M

   b) Find the minimum value of $x^2 + y^2 + z^2$ *given* $x + y + z = 3a.$ 7M

UNIT–IV

7. a) Obtain the Taylor's series expansion of sin2x about $x = \dfrac{\pi}{4}$.   7M

   b) Trace the curve $x^3 + y^3 = 3axy$.   7M

OR

8. a) Obtain the Maclaurin's series expansion of $\log(1+\sin^2 x)$ up to the term containing x^6. 7M

    b) Trace the curve $r^2 = a^2 \cos 2_n$. 7M

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UNIT–V

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9. a) Evaluate the double integral $\iint_R x\,y\,dx\,dy$ where 'R' is the region bounded by the lines 7M

    $x-axis$, ordinate $x = 2a$ and $x^2 = 4\,a\,y$

    b) Show that $\Gamma(n) = \int_0^1 \left(\log\dfrac{1}{y} \right) dy \quad (n.0)$ 7M

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OR

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10. a) Evaluate the integral by changing the order of integration $\displaystyle\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dy\,dx$ 7M

    b) Show that $S(p,q) = \displaystyle\int_0^\infty \dfrac{y^{q-1}}{(1+y)^{p+q}}dy = \int_0^1 \dfrac{x^{p-1}+x^{q-1}}{(1+x)^{p+q}}dx$ 7M

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Code: 19AC13T

I B.Tech. I Semester Supplementary Examinations August 2021
Chemistry of Materials
(Common to CE & ME)

Max. Marks: 70   Time: 3 Hours
Answer *any five* questions by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Determine the total, temporary and permanent hardness of water by EDTA method?   8M

   b) Define Hardness of Water with example and Differentiate temporary hardness and permanent hardness?   6M

OR

2. a) Explain the following
   i) Scale and Sludge ii) priming and foaming   8M

   b) Explain the treatment of saline water by reverse osmosis with neat diagram   6M

UNIT–II

3. a) Describe the construction of lead-acid battery and give the reactions occurring during the discharge process.   8M

   b) How is calomel electrode prepare? Give a neat sketch of calomel electrode.   6M

OR

4. a) Write short note on fuel cell. How is it different from commercial cell? Mention the advantages of fuel cell?   8M

   b) Give the importance of Lithium battery. Explain the basic principles of involved in it.   6M

UNIT–III

5. a) What is corrosion? Explain the mechanism of Electrochemical corrosion with diagram and equations   6M

   b) Explain a brief note on Cathodic Protection by Impressed Current and Sacrificial Anode   8M

OR

6. a) Explain the factors influence the rate of corrosion   8M

   b) Differentiate anodic and cathodic inhibitors   6M

UNIT–IV

7. a) List the differences between thermoplastic and thermosetting resins.   6M

   b) Give the preparation, properties and uses of PVC.   8M

OR

8. a) What is Portland cement? How is it manufactured?   8M

   b) What is knocking and anti-knocking agents?   6M

UNIT–V

9. a) Define nanomaterial and Explain its preparation by sol gel method   8M

   b) Define smart materials and explains its applications?   6M

OR

10. a) Explain briefly about applications of nanomaterial   6M

    b) Explain the principle involved in SEM and TEM   8M

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I B.Tech. I Semester Supplementary Examinations August 2021
Engineering Graphics -I
(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)
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UNIT–I

1. a) A point moves such that the sum of its distances from two fixed points is always
        equal to 100 mm. The distance between the fixed points is 70 mm. Draw the
        curve and locate tangent and normal to the curve at any point on it.   12M

    b) Define a conic section   2M

OR

2. a) Draw a parabola with the axis vertical, for a rise of 80 mm and a span of 80mm.
        Locate the focus and the directrix.   10M

    b) State the significance of lettering. How letters are specified.   4M

UNIT–II

3. Generate a hypocycloid of a circle of diameter 50mm and a directing circle of
    radius 100mm. Also draw normal and tangent at any point on the curve.   14M

OR

4. a) Construct an involute of a circle 50mm in diameter. Also draw the normal and
        tangent at any point.   12M

    b) Name some of the plane curves used in engineering applications.   2M

UNIT–III

5. A line *AB,* 75 mm long is in the second quadrant with the end *A* in the H.P. and
    the end *B* in the V.P. The line is inclined at 30° to the H.P. and at 45° to the V.P.
    Draw the projections of *AB.*   14M

OR

6. A point 30 mm above *xy* line is the plan-view of two points *P* and Q. The
    elevation of *P* is 45 mm above the H.P. while that of the point Q is 35 mm below
    the H.P. Draw the projections of the points and states their position with
    reference to the principal planes and the quadrant in which they lie.   14M

UNIT–IV

7. An equilateral triangular plate of 60 mm edge lies with one of its edges on the
    HP, and the surface of the plate is inclined at 40^0 to the HP. The edge on which
    it rests is inclined to the VP at 50^0. Draw its projections.   14M

OR

8. Generate the projections of a regular pentagon of 40 mm side, having its
    surface inclined at 30° to the H.P. and a side parallel to the H.P. and inclined at
    an angle of 60° to the V.P.   14M

UNIT–V

9. A pentagonal pyramid, having base with a 30mm side and 70mm long axis,
    rests on a corner of its base on HP, such that its apex is 50mm above the
    ground and the top view of the axis is inclined at 30^0 to the VP. Illustrate the
    projections.   14M

OR

10. Show the projections of a cylinder 75 mm diameter and 100 mm long, lying on
    the ground with its axis inclined at 20^0 to the V.P. and parallel to the ground. 14M

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R-19

Code: 19A511T

I B.Tech. I Semester Supplementary Examinations August 2021
Problem Solving and 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)

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UNIT–I

1. a) Define Algorithm. Explain the characteristics of algorithm   7M

    b) List and explain briefly about various computer languages   7M

OR

2. a) What is meant by flow chart? Explain the symbols used in flowchart with an example.   7M

    b) Discuss about C data types.   7M

UNIT–II

3. a) What are the different types of arrays in C? Explain with a suitable example.   7M

    b) Write a C program to find the factorial of a given number.   7M

OR

4. a) Explain conditional statements with an example.   7M

    b) Write a c program to print array of elements in ascending order using bubble sort.   7M

UNIT–III

5. a) Define string. Explain declaration of string. Explain any three string handling functions.   6M

    b) What is recursion? Explain with an example   8M

OR

6.   Explain the following key words with example. i) auto ii) register iii) static iv) extern.   14M

UNIT–IV

7. a) What is pointer? How to initialize and declare pointer variables?   7M

    b) Explain dynamic memory allocation functions.   7M

OR

8. a) Write a C program to demonstrate array of pointers.   7M

    b) Explain different parameter passing techniques with suitable examples.   7M

UNIT–V

9.   Define structure and union. Explain the syntax and accessing elements from structure and union with an example. Write the differences between structures and unions   14M

OR

10. a) Define file. Write a C program to write character to a file and reading character from file.   8M

    b) Give brief description about the various modes of a file.   6M

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