Code: 5GC14

I B.Tech. I Semester Supplementary Examinations May 2018

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)

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UNIT–I

1. a) Solve the differential equation $(1 + y^2)dx + (x - \tan^{-1} y)dy = 0$ 7M

    b) Show that the system of confocal conics $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$, where   is a parameter, is self-orthogonal.   7M

OR

2. a) Solve $\frac{dy}{dx} + \frac{y}{x \log x} = \frac{\sin 2x}{\log x}$.   7M

    b) The temperature of a body drops from 80^0C to 60^0C in 20 minutes when the temperature of the surrounding air is 25^0C. Find the temperature after 40 minutes.   7M

UNIT–II

3. a) Solve $(D^2 + 9)y = \sec 3x$, by using method of variation of parameters.   7M

    b) Solve $(D^2 + 4)y = x \sin x + (1 + x^2)e^x$ 7M

OR

4. a) Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$.   7M

    b) Solve $(D + 2)(D - 1)^2 y = e^{-2x} + 2 \sinh x$.   7M

UNIT–III

5. a) Find the series solution of the equation $2x(1 - x)\frac{d^2y}{dx^2} + (1 - x)\frac{dy}{dx} + 3y = 0$.   7M

    b) Find the Taylor's series expansion of $f(x) = \log(1 + x)$, about $x = 0$.   7M

OR

6. a) Solve in series the equation $\frac{d^2y}{dx^2} - y = 0$.   7M

    b) Prove that $\frac{v-u}{1+v^2} < \tan^{-1}v - \tan^{-1}u < \frac{v-u}{1+u^2}$ by using LMV theorem.   7M

UNIT–IV

7. a) If $u = e^{x^2+y^2+z^2}$, then find $\frac{\partial^3 y}{\partial x^3}$ 7M

    b) Find the maximum value of $x^2 + y^2 + z^2$, given that $xyz=a^3$.   7M

OR

8. a) Find the maximum and minimum values of $\sin x + \sin y + \sin(x + y)$.   7M

    b) If $u = f(x,y)$, where $x = u + v$ and $y = uv$ then show that   7M

$$u\frac{\partial z}{\partial u} + v\frac{\partial z}{\partial v} = x\frac{\partial z}{\partial x} + 2y\frac{\partial z}{\partial y}.$$

UNIT–V

9. Trace the curve $y^2(a+x) = x^2(3a-x)$.   14M

OR

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

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Code: 5GC15

I B.Tech. I Semester Supplementary Examinations May 2018

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)

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UNIT–I

1. a) Define the rank of the matrix and find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$

    by reducing it to normal form.   7M

    b) Solve the system of equations $3x + 4y - z - 6w = 0$, $2x + 3y + 2z - 3w = 0$, $2x + y - 14z - 9w = 0$ and $x + 3y + 13z + 3w = 0$.   7M

OR

2. a) Determine the values of λ and μ for which the equations $x + 2y + 3z = 6$, $x + 3y + 5z = 9$ and $2x + 5y + \lambda z = \mu$ has (i) No solution (ii) Unique solution (iii) Infinitely many solutions.   7M

    b) Solve the equations $x + 4y - z = -5$, $x + y - 6z = -12$ and $3x - y - z = 4$ using Gauss elimination method.   7M

UNIT–II

3. a) Find the Eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & 2 \\ 0 & 0 & 3 \end{bmatrix}$ 6M

    b) State and verify Caley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 2 & 3 & 1 \end{bmatrix}$ and

    hence, find A^4.   8M

OR

4. Diagonalize the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ -1 & 2 & 2 \end{bmatrix}$ and hence find A^5.

                                                                           14M

UNIT–III

5. Discuss the nature of the quadratic form $3x^2 + 2y^2 + 3z^2 - 2xy - 2yz$ by reducing it to canonical form using orthogonal transformation.   14M

OR

6. a) Show that the eigen values of unitary matrix is of unit modulus. 6M

b) Show that $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ is Hermitian. Find its eigen values and eigen vectors. 8M

UNIT–IV

7. Find the positive real root of the equation $x - e^{-x} = 0$ correct to three decimal places by (i) Newton-Raphson method (ii) Regula-Falsi method. 14M

OR

8. a) Find the real root of the equation $x^4 - x - 10 = 0$ using bisection method correct to three decimal places. 7M

b) Using Regula-Falsi method, compute the real root of the equation $2x - 3\sin x = 5$ correct to three decimal places. 7M

UNIT–V

9. a) The table gives the distance in kilometers of the visible horizon for given heights of in meters above the earth's surface:

x (heights)	100	150	200	250	300	350	400
y (distance)	12	16	21	27	36	50	72

Find the values of distance y, when $x = 125$ meters and $x = 360$ meters 8M

b) Using Lagrange's interpolation formula, find the values of $f(4)$

x	0	2	3	6
$f(x)$	-4	2	14	158

6M

OR

10. a) A slider in the machine moves along a fixed straight rod. Its distance $x\ cm$ along the rod is given below for various values of time $t\ \sec$. Find the velocity of the slider when $t = 0.1\ \sec$.

t	0	0.1	0.2	0.3	0.4	0.5	0.6
x	30.13	31.62	32.87	33.64	33.95	33.81	33.24

6M

b) Given that

x	4	4.2	4.4	4.6	4.8	5.0	5.2
$f(x)$	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $\int_{4}^{5.2} f(x)\,dx$ by using (i) Simpson's rule (ii) Weddle's rule. 8M

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I B.Tech. I Semester Supplementary Examinations May 2018
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)
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UNIT–I

1. a) Explain briefly about different computer languages.   7M
    b) Explain the software development method in detail.   7M

OR

2. a) What is algorithm? What are the main steps followed in the development of an algorithm?   8M
    b) Draw flowchart and write algorithm to find sum of the digits in a given number.   6M

UNIT–II

3. a) Explain about the basic data types in C language with examples   8M
    b) Write a C program to swap (exchange) the values of two variables without using temporary variable.   6M

OR

4. a) What is meant by type conversion? Why is it necessary? Explain about implicit and explicit type conversion with examples.   9M
    b) Write a program to enter two numbers and find the largest of them. Use conditional operator.   5M

UNIT–III

5. a) Explain various selection statements available in C language with examples.   8M
    b) Write a program to print whether a given number is prime or not.   6M

OR

6. a) Explain various iterative statements available in C language with examples.   8M
    b) Write a program to find out whether the given number is Armstrong or not?   6M

UNIT–IV

7. a) What is Array? Discuss about the initialization and accessing of array elements in one dimensional and two dimensional arrays.   8M
    b) Write a program to find the maximum element of an array.   6M

OR

8. a) Explain the following string handling functions with examples:
       (i) strcpy( ) (ii) strcat( ) (iii) strrev( ) (iv) strlen( )   8M
    b) Write C program to concatenate two strings without using strcat( ) function   6M

UNIT–V

9. a) Explain about call by value and call by reference mechanisms with examples   8M
    b) What are the standard header files used in 'C'? Explain their functions.   6M

OR

10. Explain about different storage classes with examples   14M

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Code: 5GC12

I B.Tech. I Semester Supplementary Examinations May/June 2018

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)

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UNIT–I

1. a) A sample of water on analysis has been formed to contain the following $Ca(HCO_3)_2$: 32.4ppm; $CaSO_4$: 13.6ppm; $MgCl_2$: 19.0ppm; $Mg(HCO_3)_2$: 14.6ppm. Calculate temporary permanent hardness of sample in degree French.

   (At wt. of Ca, Mg, O, C, Cl, S, H are 40, 24, 16, 12, 35.5, 32 and '1' respectively)   7M

   b) What are boiler troubles? Explain scales and sludges in details.   7M

OR

2. a) Describe the estimation of hardness of water by EDTA method.   7M

   b) What is meant by sterilization of water? Explain how sterilization of water is done by using chlorine and ozone.   7M

UNIT–II

3. Answer the following
   - (a) Electro chemical cells   7M
   - (b) Lithium Ion batteries   7M

OR

4. a) What is meant by galvanic corrosion? Explain in details.   7M

   b) What are the factors influencing corrosion reaction?   7M

UNIT–III

5. a) Explain preparation, properties and applications of Bakelite.   7M

   b) Define plastics and how they are classified? Explain.   7M

OR

6. a) Define conducting polymer? Write the synthesis and application of Polyaniline?   7M

   b) Write notes on compounding of rubber.   7M

UNIT–IV

7. a) Write manufacturing of metallurgical cake by Otto Hoffmann's by product oven process in detail.   7M

   b) Define calorific value of a fuel sample? Write the classification and units of calorific value of a fuel sample?   7M

OR

8. a) Write short notes on (i) Producer gas, (ii) Octane number   7M

   b) What is synthetic petrol? How it is prepared by Fischer Tropsch's process.   7M

UNIT–V

9. a) Write setting and hardening of cement with suitable equations?   7M

   b) Define refractories? Write the application of refractories?   7M

OR

10. a) What are lubricants? Explain any two important properties of lubricants?   7M

    b) Write notes on Rocket propellants.   7M

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I B.Tech. I Semester Supplementary Examinations May 2018
Engineering Drawing- I
(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)
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UNIT–I

1. a) Divide a line length 125 MM in the ratio 1 : 3 : 4.

    b) Inscribe a hexagon in a circle of Radius 20 MM.

OR

2. a) Construct a Pentagon, given the length of the side is Equal to 30 MM.

    b) Draw a tangent to a circle with convenient radius.

UNIT–II

3. a) A plot of ground is in the shape of a rectangle of size 100 x 60m. Inscribe an elliptical lawn in it.

    b) Draw a parabola whose focus is at a distance of 50 mm from the directrix. Draw a tangent and normal at any point on it

OR

4. a) A vertex of a hyperbola is 50 mm from its focus. Draw two parts of the hyperbola; if the eccentricity is *3/2*.

    b) Draw a parabola if the longest ordinate of it is 50 mm and abscissa is 120 mm. Locate its focus and directrix

UNIT–III

5. a) Construct a cycloid having a rolling circle of 60 mm diameter. Also draw a tangent and normal at any point P on the curve

    b) Draw a hypocycloid having a generating circle of r1iameter 50 mm and directing circle of radius 10 mm. Also draw a normal and a tangent at any point M on tile curve

OR

6. a) Draw a hypocycloid for a rolling circle of diameter 75 mm and a base circle of 250 mm diameter. Draw a tangent and a normal at any point on the curve.

    b) Construct an epicycloid having a generating circle of diameter 75mm and a directing curve of radius 200 mm. Also draw a normal and a tangent at a point P on the curve

UNIT–IV

7. a) 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;

    b) 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

OR

8. a) A line AB 45 mm long is in H.P. and inclined to V.P. The end A is 15 mm in front of V.P. The length of the front view is 35 mm. Draw the projections of the line. Determine its inclination with V.P.

    b) A line 75 mm long is inclined at 50° to VP and one of the ends is on it. It is parallel to HP and 40 mm below it. The line is behind VP. Draw its projections.

UNIT–V

9. a) Line AB is 75 mm long and it is 30^0& 40^0 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 300 to the H.P. and at 450 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 I.-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.

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