R-14

Code: 4GC15

B.Tech. I Year Supplementary Examinations Nov/Dec 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 = 70Marks)
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UNIT–I

1. a) Determine the rank of a matrix $\begin{bmatrix} 1 & -1 & 3 & 6 \\ 1 & 3 & -3 & -4 \\ 5 & 3 & 3 & 10 \end{bmatrix}$ by reducing it into echelon form.   7M

   b) If is an eigen value of a non-singular matrix A ,then prove that $\frac{|A|}{\lambda}$adj value is an eigen A   of   7M

OR

2. a) Prove that the equations 3x+3y +2z =1, x+2y=4, 10y + 3z = -2, 2x – 3y - z = 5 are consistent and solve them.   7M

   b) Define rank of the matrix and find the rank of the following matrix by reducing into Normal form A = $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & -4 \\ 2 & 3 & 5 & -5 \\ 3 & 4 & -5 & 8 \end{bmatrix}$ 7M

UNIT–II

3. a) Express the matrix $\begin{bmatrix} 1+i & 2 & 5-5i \\ 2i & 2+i & 4+2i \\ -1+i & -4 & 7 \end{bmatrix}$ as the sum of Hermitian matrix and a Skew Hermitian matrix   10M

   b) If A and B are Hermitian matrices, prove that AB – BA is a Skew-Hermitian   4M

OR

4. a) Prove that $\frac{1}{2}\begin{bmatrix} i & \sqrt{3} \\ \sqrt{3} & i \end{bmatrix}$ is a unitary matrix. Find its Eigen values   7M

   b) Show that $A = \begin{bmatrix} a+ic & -b+id \\ b+id & a-ic \end{bmatrix}$ is unitary if $a^2 + b^2 + c^2 + d^2 = 1$ 7M

UNIT–III

5. Find a root of the equation $x^3 - 4x - 9 = 0$, using Bisection method correct to three decimal places.   14M

OR

6. a) Derive Newton's forward and backward interpolation formulae.   10M

   b) Find $\Delta \tan^{-1}\left(\frac{n-1}{n}\right)$ 4M

UNIT–IV

7. a) Derive simpson's 1/3 rule for finding the integration of a function y = f(x) in (a, b)   7M

   b) Evaluate $\int_0^1 \dfrac{dx}{1+x}$ by using Sipson's 1/3 rule with h = 0.1.

   7M

OR

8. a) Given that

x	1	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\dfrac{dy}{dx} \, and \, \dfrac{d^2 y}{dx^2}$ at **(i)** x = 1.1 and **(ii)** x =1.6.

7M

   b) The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data:

Time (t) sec	0	5	10	15	20
Velocity (v)	0	3	14	69	228

7M

UNIT–V

9. Obtain the Fourier series to represent the function f(x) = x² in the interval 0< x < 2

14M

OR

10. Using the method of separation of variables solve the equation $\dfrac{\partial u}{\partial x} = 2 \dfrac{\partial u}{\partial t} + u$

with u(x,0) = 6e⁻³ˣ   14M

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B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Drawing
(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 circle of 50 mm diameter rolls on the circumference of another circle of 175 mm diameter and outside it. Trace the locus of a point on the circumference of the rolling circle for one complete revolution. Name the curve. Draw a tangent and normal to the curve at a point 125 mm from the centre of the directing circle.   14M

OR

2. a) The major and minor axis of an ellipse is 120&80 mm. Draw an ellipse by arcs of circles method.   7M

   b) Construct a parabola by rectangle method with the base dimension 140 mm and height 100 mm. And also draw the tangent and normal to the parabola at any suitable point   7M

UNIT–II

3. The front view of a line AB measures 65 mm and makes an angle of 45° with xy. A is in the H.P. and the V.T. of the line is 15 mm below the H.P. The line is inclined at 30° to the V.P. Draw the projections of AB and find its true length and inclination with the H.P. Also locate its H.T.   14M

OR

4. 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 and determine its traces.   14M

UNIT–III

5. Draw the projections of a circle of 75 mm diameter having the end A of the diameter AB in the H.P., the end B in the V.P, and the surface inclined at 30° to the H.P. and at 60° to the V.P.   14M

OR

6. Draw the projections of a rhombus having diagonals 125 mm and 50 mm long, the smaller diagonal of which is parallel to both the principal planes, while the other is inclined at 30° to the H.P.   14M
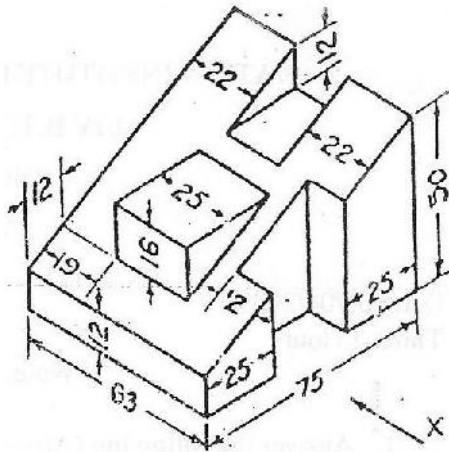
UNIT–IV

7. A tetrahedron of 75 mm long edges has one edge parallel to the H.P. and inclined at 45° to the V.P. while a face containing that edge is vertical. Draw its projections.   14M

OR

8. A hexagonal prism, base 30 mm side and axis 75 mm long, has an edge of the base parallel to the H.P. and inclined at 45° to the V.P. Its axis makes an angle of 60° with the H.P. Draw its projections.   14M
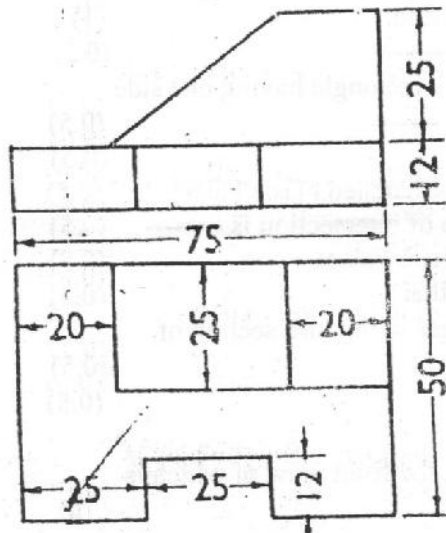
UNIT–V

9.

Draw the front view and top view of shown fig.1   14M

OR

10.   Convert the orthogonal projections shown in fig 2 into isometric view of the actual picture.

14M

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B.Tech. I Year Supplementary Examinations Nov/Dec 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)
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UNIT–I

1. a) Comment on impurities of water and mention the units of hardness in detail.   7M
    b) Calculate the temporary and permanent hardness of water sample containing $Mg(HCO_3)_2$=7.3mg/L, $Ca(HCO_3)_2$=16.2mg/L, $MgCl_2$= 9.5mg/L, $CaSO_4$=13.6mg/L)   7M

OR

2. a) Write any two internal treatment methods for industrial water purification.   7M
    b) Explain Ion-Exchange process in detail.   7M

UNIT–II

3. a) What are fuel cells? Write the working procedure for H_2-O_2 fuel cell   7M
    b) Write a note on lead-acid batteries with chemical reactions involving.   7M

OR

4. a) Explain any two methods for prevention of corrosions.   7M
    b) Explain the factors which effect the corrosion.   7M

UNIT–III

5. a) Write the engineering applications of Bakelite and nylon-6,6.   7M
    b) Explain the preparation, properties and applications of Buna-N rubber.   7M

OR

6. a) Write the synthesis and applications of polyacetylene and polyanline.   7M
    b) Comment on the role of biodegradable polymers in present scenario.   7M

UNIT–IV

7. a) Determine the calorific value of a fuel by using bomb calorimeter.   7M
    b) Write a note on synthesis of petrol from Fischer Tropsch's synthesis.   7M

OR

8. a) What is power alcohol? Mention the advantages and disadvantages of power alcohol.   7M
    b) Comment on the following
        i) Producer gas   **ii**) Water gas   **iii**) Biogas   7M

UNIT–V

9. a) What is the composition of Portland cement? Explain setting and hardening of it   7M
    b) Comment on refractories   7M

OR

10. a) What are the properties of lubricants? Explain the theory of lubrication.   7M
    b) Write any seven applications of refractories.   7M

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Hall Ticket Number :

R-14

Code: 4GC12

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Engineering Physics
(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 the Interference due to thin films and draw the conditions for constructive and destructive Interference.   10M

   b) A parallel beam of light of wavelength 5890 A^o is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction in to the plate is 60°. Calculate the smallest thick ness of the glass plate which will appear dark by reflection.   4M

OR

2. a) Describe the construction and working of He-Ne laser with energy level diagram   10M

   b) Derive an expression for numerical aperture of an optical fiber and calculate acceptance angle of an optical fiber if the refractive index of core and cladding are 1.623 and 1.522 respectively.   4M

UNIT–II

3. a) What are the miller indices? How they are obtained?   4M

   b) Describe the powder method of determination of crystal system.   7M

   c) Copper has fcc structure and the atomic radius is 0.1278 nm. Calculate the inter planar spacing of (110) and (212) planes.   3M

OR

4. a) What are the properties of Ultrasonics? How do you produce Ultrasonics by Piezo electric oscillator method   10M

   b) Calculate the frequency of the fundamental note emitted by Piezo-electric crystal. Use the following data:

   vibrating length = 3mm, Youngs modulus = 8×10^{10} N/m^2 and density of the crystal= 2.5 gm/cm^3.   4M

UNIT–III

5. a) Give an account of Heisenberg's uncertainty principle. Outline an idealized experiment to bring out its significance.   10M

   b) Write down the Schrodinger time independent wave equation for matter waves. Calculate energy levels of a particle confined in an infinite potential well.   4M

OR

6. a) Discuss the Kronig-Penny model for the motion of an electron in a periodic potential.   10M

   b) Find the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-4} Ohm-m, if the metal has 5.8×10^{28} conduction electrons per m^3 4M

UNIT–IV

7. a) Write the principle, working of the P-N junction diode. 7M

    b) Explain the construction and working of
       (i) LED
       (ii) Photo diode 7M

OR

8. a) Define Magnetic moment. Explain the origin of magnetic moment at the atomic field. 5M

    b) Write short notes on
       (i) Ferromagnetic materials
       (ii) Ferrites. 6M

    c) What are the applications of Ferrites 3M

UNIT–V

9. a) What are cooper pairs? How they produce super conductivity in materials. 5M

    b) Explain Type I and Type II super conductors 5M

    c) The Transition temperature for lead is 8.7 K. The maximum critical field for the material is 6×10^5 A/m. Lead has to be used as a super conductor subjected to a magnetic field of 3×10^6 A/m 4M

OR

10. a) Write the properties of Carbon nanotubes 8M

    b) Write any four applications of Nanomaterials 6M

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Code: 4GC14

R-14

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
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 $(1+y^2)dx = (\tan^{-1}y - x)dy$ — 7M

    b) Find the solution for the differential equation $x\dfrac{dy}{dx} + y = x^3 y^6$ — 7M

OR

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

    b) The rate at which the bacteria multiply is proportional to the instantaneous number present. If the original number doubles in 2 hours, in how many hours will it triple? — 7M

UNIT–II

3. Verify Rolle's Theorem for the function $f(x) = x(x+3)e^{-x/2}$ in $[-3,0]$ and find the value of C — 14M

OR

4. Using Taylor's theorem, express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of (x-1). — 14M

UNIT–III

5. a) Evaluate $\iint \dfrac{r\,dr\,d\theta}{\sqrt{a^2+r^2}}$ over one loop of the lemniscate $r^2 = a^2\cos2\theta$ — 7M

    b) Evaluate $\iint r^3\,dr\,d\theta$ over the area bounded between the circles $r = 2\cos\theta$ and $r = 4\cos\theta$ — 7M

OR

6. a) Evaluate the integral by changing the order of integration $\int_0^\infty \int_0^\infty \dfrac{e^{-y}}{y}\,dy\,dx$ — 7M

    b) By changing the order of integration, evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2\,dy\,dx$ — 7M

UNIT–IV

7. a) Find the Laplace transform of

    i) $\left\{\dfrac{\sin3t.\cos t}{t}\right\}$. ii) $\{t^2\sin2t\}$. — 7M

    b) Find $L^{-1}\left\{\dfrac{s^2}{(s^2+4)(s^2+9)}\right\}$ Using Convolution theorem. — 7M

OR

8. a) Find the Laplace Transform of $\left\{\left(\sqrt{t} - \dfrac{1}{\sqrt{t}}\right)^3\right\}$ — 7M

    b Find $L^{-1}\left\{\dfrac{s^2}{(s^2+a^2)(s^2+b^2)}\right\}$ Using Convolution theorem. — 7M

UNIT–V

9. a) Find the angle between the surfaces $x^2+y^2+z^2 = 9$ and $Z = x^2+y^2 - 3$ at the point (2, -1,2) — 7M

    b) Find a unit vector normal to the surface $x^3+y^3+3xyz = 3$ at the point (1, 2,–1) — 7M

OR

10. Using divergence theorem Prove that

    i) $\displaystyle\int_S \bar{R}.\,d\bar{s} = 3V$ ii) $\displaystyle\int_S \nabla r^2\,d\bar{s} = 6V$

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Code: 4G111

B.Tech. I Year Supplementary Examinations Nov/Dec 2016
Programming in C and Data Structures
(Common to CSE & IT)

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

1. a) What is a flow chart and give the symbols for flowchart?   7M
    b) Explain about declaration, initialization and operations on different variables   7M

OR

2. a) Write the structure of simple C program   4M
    b) Define Algorithm. Write an algorithm for swapping of two given numbers.   9M

UNIT–II

3. a) Explain with examples, logical bitwise operators.   7M
    b) Write a program to print sum of even numbers between 1 and 100 using while
        loop.   7M

OR

4. a) Explain with examples, break and continue statements.   7M
    b) Explain with examples, if…else and nested if….else statements.   7M

UNIT–III

5. a) Write a c program to find the sum of the diagonal elements of a square matrix.   6M
    b) What are the scope rules of C language?   8M

OR

6. a) How arrays are passed to functions. Illustrate with an example. What
        parameter passing technique is used?   7M
    b) Assume an array contains numbers from 1 to 10. Count the number of
        occurrences of 2, 5 and 9.   5M

UNIT–IV

7. a) Write a C program to count number of lines, words and characters in a file.   9M
    b) Distinguish between Structures and Union.   5M

OR

8. a) Explain about Exchange sort in detail.   7M
    b) Explain about linear search with suitable example.   7M

UNIT–V

9. a) Illustrate the implementation of stack using linked list with example.   7M
    b) State binary search tree property. And construct the binary search tree for the
        following keys: G , K, L ,R, A, C, T, F, J, T, Y, E.   7M

OR

10. a) Describe any two applications of queues.   5M
    b) Give the step wise procedure for performing insertions on doubly linked list with
        example.   9M

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