

Code: 5GC24

I B.Tech. II Semester Supplementary Examinations May 2019

**Engineering Mathematics-II**

(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. Change the order of integration in  $\int_0^1 \int_{x^2}^{1-x} xy^2 dy dx$  and hence evaluate the same. 14M

**OR**

2. a) Find the area of a plane in the form of a quadrant of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . 7M  
 b) Evaluate  $\int_0^{\frac{\pi}{2}} \int_0^{\sin \theta} \int_0^{a^2-r^2} r dz dr d\theta$ . 7M

**UNIT-II**

3. a) Evaluate  $\int_0^{\infty} e^{-t} \left( \frac{\cos at - \cos bt}{t} \right) dt$ . 7M  
 b) Find the Laplace transform  $\int_0^t e^{t-\tau} \sin \tau d\tau$ . 7M

**OR**

4. a) Find  $L^{-1} \left\{ \frac{s^2}{(s^2+a^2)(s^2+b^2)} \right\}$  by convolution theorem. 7M  
 b) Find  $L^{-1} \left\{ \frac{s^2+a^2}{s(s^2+b^2)} \right\}$ . 7M

**UNIT-III**

5. Solve  $(D^2 + 9)x = 4 \cos 2t$  using Laplace transform given that  $x(0) = 1, x\left(\frac{\pi}{2}\right) = -1$ . 14M

**OR**

6. Solve  $y'' - 3y' + 2y = 4e^{3t}$ ,  $y(0) = 1, y'(0) = 1$ . 14M

**UNIT-IV**

7. a) Find a unit vector normal to the surface  $xyz = 4$  at the point  $(-1, -1, 2)$ . 7M  
 b) If **A** and **B** are irrotational, prove that **A** × **B** is solenoidal. 7M

**OR**

8. Evaluate the line integral  $\int_C (xy + x^2) dx + (x^2 + y^2) dy$ , where C is the square formed by the lines  $y = \pm 1$  and  $x = \pm 1$ . 14M

**UNIT-V**

9. Verify Green's theorem for  $\int_C [(x^2 - 8y^2) dx + (4y - (xy) dy)]$ , where C is bounded by the region  $x = 0, y = 0$  and  $x + y = 1$ . 14M

**OR**

10. Verify Stoke's theorem for  $\oint_C \mathbf{F} \cdot d\mathbf{r}$  where  $\mathbf{F} = (x^2 + y^2) \mathbf{i} - 2xy \mathbf{j}$  taken around the rectangle bounded by the lines  $x = \pm a, y = 0, y = b$ . 14M

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**Code: 5GC23**

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

**Engineering Physics**

( 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 )

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| <b>UNIT-I</b> |
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1. a) Explain the process of induced absorption, spontaneous emission and stimulated emission. Obtain an expression for energy density of radiation under equilibrium conditions in terms of Einstein A & B Coefficients. 8M
- b) In a Newton's rings experiment the diameter of the 15 ring was found to be 0.59cm and that of the 5th ring is 0.336 cm. If the radius of curvature of the lens is 100 cm, find the wave length of the light. 6M

**OR**

2. a) Explain the construction and working of semiconductor laser 7M
- b) Describe the principle on which optical fiber works and obtain an expression for numerical aperture. 7M

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| <b>UNIT-II</b> |
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3. a) What are Miller Indices? Obtain an expression for inter planar spacing in terms of Miller indices 8M
- b) Describe in detail how a flaw in solid material is detected by non destructive method using ultrasonics. 6M

**OR**

4. a) Define Packing factor. Calculate the packing factor of BCC and FCC 8M
- b) Draw the following planes in a cubic unit cell (0 1 1), (1 0 2) and (1 3 2) 6M

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| <b>UNIT-III</b> |
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5. a) State Heisenberg uncertainty principle. Based on the principle, prove that free electrons cannot exist inside the nucleus of an atom 7M
- b) Mention the assumptions of classical free electron theory. Based on classical free electron theory derive the expression for electrical conductivity of a metal. 7M

**OR**

6. a) Assuming the time independent Schrodinger wave equation in one dimension, discuss the solution of a particle in one dimensional potential well of infinite height. Hence obtain the normalized wave function. 10M
- b) Find the temperature at which there is 1% probability that a state with an energy 0.5eV above Fermi energy is occupied. 4M

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| <b>UNIT-IV</b> |
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7. a) What is Hall effect? Obtain an expression for the Hall coefficients. 8M
- b) Discuss Magnetic vehicles and SQUIDS. 6M

**OR**

8. a) What is Meissner effect? Discuss type I and type II superconductor with examples. 7M
- b) Discuss how Cooper pairs are formed? What is the importance of Cooper pairs in superconductivity? 7M

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| <b>UNIT-V</b> |
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9. a) What are ferromagnetic materials? Discuss the hysteresis of a ferromagnetic material 7M
- b) Explain the synthesis of nanomaterials using chemical vapour deposition. 7M

**OR**

10. a) What are Hard and Soft magnetic materials? Compare them on the basis of hysteresis curves. Give three examples of each type. 8M
- b) What are nano materials? Explain the structure and properties of carbon nanotubes. 6M

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**R-15**

**Code: 5GC25**

I B.Tech. II Semester Supplementary Examinations May 2019

**Mathematical Methods-II**  
( 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) Use the method of least squares to fit a straight line  $y = a+bx$  for the following data.

|   |   |     |     |     |     |
|---|---|-----|-----|-----|-----|
| X | 0 | 1   | 2   | 3   | 4   |
| Y | 1 | 1.8 | 3.3 | 4.5 | 6.3 |

b) Fit a parabola of the form  $y=a+bx+cx^2$  for the following data.

|   |      |      |      |      |      |      |
|---|------|------|------|------|------|------|
| X | 10   | 15   | 20   | 25   | 30   | 35   |
| Y | 35.3 | 32.4 | 29.2 | 26.1 | 23.2 | 20.5 |

**OR**

2. a) Fit a straight line  $y = ax + b$  for following data

|   |    |    |    |    |    |
|---|----|----|----|----|----|
| X | 1  | 2  | 3  | 4  | 5  |
| Y | 14 | 27 | 40 | 55 | 68 |

b) By the method of least squares, fit a parabola of the form  $y=a+bx+cx^2$  for the following data.

|   |     |     |     |      |      |      |      |
|---|-----|-----|-----|------|------|------|------|
| X | 1   | 2   | 3   | 4    | 5    | 6    | 7    |
| Y | 2.3 | 5.2 | 9.7 | 16.5 | 29.4 | 35.5 | 54.4 |

**UNIT-II**

3. a) Find the value of  $y$  at  $x = 1$  if  $\frac{dy}{dx} = 1 + xy$ , and  $y(0)=1$  using Picard's method.

b) Using Taylor's series method, compute the value of  $y$  at  $x=1.1$  from  $\frac{dy}{dx} = x + y$ ;  $y(1) = 0$ .

**OR**

4. a) Using R-K method to evaluate  $y(0.1)$  given that  $y' = y^2 + x$ ,  $y(0) = 1$

b) Find the values of  $y$  at  $x = 0.1$  from  $\frac{dy}{dx} = x^2 - y$ ,  $y(0)=1$  by Taylor's series method.

**UNIT-III**

5. a) Obtain the Fourier Series for  $f(x) = x$  in  $(0, 2)$

b) Express  $f(x) = x$  as half range sine series in  $0 < x < 2$

**OR**

6. a) Find the Fourier series to represent  $f(x) = |x|$  when  $-f < x < f$  and deduce that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}$$

b) Obtain the Fourier cosine series for  $f(x) = x \sin x$ ,  $0 < x < f$

**UNIT-IV**

7. Find Fourier cosine and sine transforms of  $e^{-ax}$ ,  $a > 0$  and hence deduce their inversion formulae.

**OR**

8. a) Find the Fourier transform of  $f(x)$  given by  $f(x) = \begin{cases} 1, & \text{for } |x| < 1 \\ 0, & \text{for } |x| > 1 \end{cases}$

b) Find the Fourier cosine transform of  $f(x) = e^{-ax}$  ( $x > 0, a > 0$ ).

**UNIT-V**

9. a) Eliminate the arbitrary function  $f$  from  $z = x - y + f(x, y)$

b) Obtain the solution of PDE  $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$

**OR**

10. Solve  $2z + p^2 + qy + 2y^2 = 0$  by using Charpits Method

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Hall Ticket Number :

**R-15**

**Code: 5G121**

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

**C Programming and Data Structures**

( 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) What is meant by a pointer? Write a program to swap the values of two variables using pointers. 7M
- b) Write a program to show the usage of pointer to structure. 7M

**OR**

2. a) Demonstrate the use of &(address of) and \*(value at address) operators 7M
- b) Write a program to show a function returning pointer. 7M

**UNIT-II**

3. a) What is a structure? Explain the syntax of Structure declaration with example 7M
- b) How Selection sort is different from bubble sort? 7M

**OR**

4. a) Define Union. Explain its general syntax with one example. 7M
- b) Arrange the following integers in ascending order using Merge sort procedure.  
39,48,62,18,23,34,58,12. 7M

**UNIT-III**

5. a) Explain stack with basic Operations (push and pop). 7M
- b) Design the procedure to count number of parenthesis in an expression using Stack. 7M

**OR**

6. Compare Linear Queue and Circular Queue. Write a program to insert and delete from a circular queue. 14M

**UNIT-IV**

7. Implement Insertion, Deletion and search operations at any position in a singly linked list. 14M

**OR**

8. a) Write insertion and deletion functions for the doubly linked list. 7M
- b) Summarize Circular Linked List 7M

**UNIT-V**

9. a) Construct a Binary tree T by using the following in order and post order traversals of T.  
In order: D K I B A E G H J F C  
Post Order: K D I E A G B F C J H. 7M
- b) Explain various methods of representing graphs in memory. 7M

**OR**

10. What is Binary Search Tree (BST)? How do we do search in BST? Write a procedure for insertion and deletion operations on BST. 14M

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Code: 5G523

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

**Engineering Drawing –II**

( 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. Draw the projections of a regular pentagon of 30mm side with its surface is making an angle of  $30^\circ$  with H.P. One of the sides of the pentagon is lying on the H.P and perpendicular to V.P.

**OR**

2. A regular hexagonal plane of 35mm side has a corner at 20mm from V.P and 50mm from H.P. Its surface is inclined at  $45^\circ$  to V.P and perpendicular to H.P. Draw the projections of the plane.

**UNIT-II**

3. Draw the projections of a cone its base 50mm diameter and axis 80mm long. The cone is lying on the H.P by one of its generators with its axis parallel to the V.P.

**OR**

4. A triangular prism of base 30mm side and axis 50mm long is resting on H.P on one of its base edge such that the edge is perpendicular to V.P. Draw the projections of the solid when its axis is  $45^\circ$  inclined to H.P.

**UNIT-III**

5. A hexagonal prism of base 25mm side and axis 45mm long is positioned with one of its base edges on H.P such that the axis is inclined at  $30^\circ$  to H.P and  $45^\circ$  to V.P. Draw the projections of the prism.

**OR**

6. A cone of base diameter 50mm and altitude 60mm is lying on one of its generators on the H.P and its axis makes an angle of  $30^\circ$  with the V.P.

**UNIT-IV**

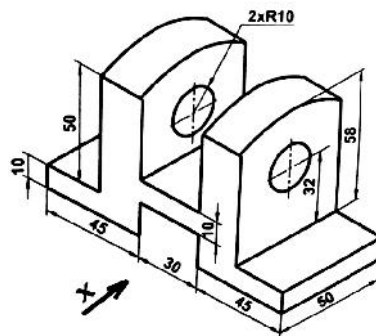
7. Draw the isometric view of a cylinder of base diameter 30mm and height is 70mm, when its axis is perpendicular to H.P.

**OR**

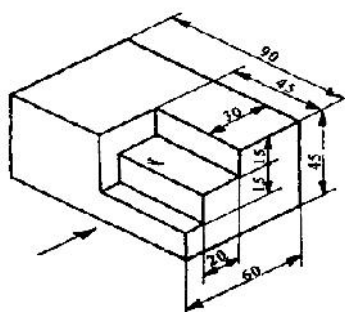
8. Draw the isometric view of a pentagonal pyramid of base side 30mm and height is 75mm, when its axis is perpendicular to H.P.

**UNIT-V**

9. The Figure shows a machine component. Draw its (i) Front view (ii) Top view (iii) Side view. Assume all the dimensions are in 'mm'.

**OR**

10. The Figure shows an object. Draw its (i) Front view (ii) Top view (iii) Side view. Assume all the dimensions are in 'mm'.



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