FACULTY OF ENGINEERING
B.E. (AICTE) II-Semester (Backlog) Examination, July 2021

Subject : Mathematics – II

Time: 2 hours   **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions.   **(5x2 = 10 Marks)**

1 Define rank of a matrix. Find the rank of the matrix

$$A = \begin{pmatrix} 1 & -1 & 2 \\ -2 & 2 & -4 \end{pmatrix}$$

2 Determine the nature of the quadratic form $Q = 2(x^2 + xy + y^2)$.

3 Solve $y' + y \tan x = \cos x$.

4 Find the orthogonal trajectories of the family of curves $r = a\theta^2$.

5 Obtain a particular integral of $y'' + y = \sin^2 x$.

6 If $y_1 = x^4$ is a solution of $x^2 y'' - 2xy' - 4y = 0$, find the second linearly independent solution.

7 Find the value of $P_n'(-1)$.

8 Show that erf(x) + erfc(x) = 1.

9 Find the Laplace transform of $f(t) = e^{-t}\cosh 2t$.

10 If $L\{f(t)\} = \cot^{-1} s$, find $f(t)$.

PART – B

Answer any four questions.   **(4x15 = 60 Marks)**

11 (a) Determine whether the vectors (2, 3, 1, -1), (2, 3, 1, 2), (4, 6, 2, 1) are linearly dependent.

     (b) If $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$, then find the matrix A^{32} using Cayley-Hamilton theorem.

12 (a) Solve $(y - 2x^3)dx - x(1 - xy)dy = 0$.

     (b) Solve $\dfrac{dy}{dx} = 4x^2(y - x)^2 + \dfrac{y}{x}$ if $y = x$ is a solution.

13 (a) Solve $y'' - 4y' + 4y = 8x^2 e^{2x}\sin 2x$.

     (b) Find the general solution of $x^2\dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} + y = \sin(\log x^2)$.

14 (a) Show that $\beta(m,n) = \dfrac{\Gamma m\ \Gamma n}{\Gamma(m+n)}$.

     (b) Find the power series solution of the differential equation $y'' + y = 0$ about $x = 0$.

15 (a) Find the Laplace transform of $f(t) = \dfrac{e^{2t} - e^{3t}}{t}$.

   (b) Using convolution theorem, find $L^{-1}\left\{\dfrac{1}{s^2(s-4)}\right\}$.

16 (a) Find the eigen values and the corresponding eigen vectors of the matrix

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}$$

   (b) Solve $y'' - y = e^x$ by the method of variation of parameters.

17 Using Laplace transform, solve $y'' + 2y' + 5y = e^{-t}\sin t,\ y(0) = 0,\ y'(0) = 1$.

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FACULTY OF ENGINEERING

B.E. II-Semester (CBCS) (Backlog) Examination, July 2021

Subject: Engineering Physics - II

Time: 2 hours **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions. **(5x2 = 10 Marks)**

1 Define unit cell, Draw cubic crystal unit cell.

2 What is meant by a crystal defect and mension two defects?

3 What are dia Magnetic Materials, Mension two of them?

4 Define Super conductor and write it's two properties

5 What is a thermistor? Draw its Temperature (T) Vs Resistance (R) graph.

6 What is a Ferro electric material, give an example.

7 What is meant by Fluorescence?

8 What are Nano materials?

9 Explain about CVD.

10 What are Carbon Nanotubes (CNT) and Mention different types of CNT.

PART – B

Answer any four questions. **(4x15 = 60 Marks)**

11 Explain different crystal systems with diagrams.

12 Explain Kronig-penny Model of Band theory.

13 What is Magnetic Domain and explain Hyslesesis curve.

14 Discuss about High T_c Super conductors and Josephson Junction.

15 Derive an expression for electronic polanization.

16 Explain Quantum Mechanical explanation of Raman effect.

17 Explain about Nano Materials and Discuss their preparation method by Top-down process.

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