Code No. 14508/CBCS/BL

FACULTY OF ENGINEERING

B.E. II – Semester (CBCS) (Backlog) Examination, October 2021

Subject : Engineering Physics-II

Time: 2 Hours **Max marks: 70**

Missing data, if any, may be suitably assumed

PART – A

Note: **Answer any Five questions**. **(5x2=10 Marks)**

1. What are Miller Indices? Explain with an example
2. Write a short note on Point defects?
3. Draw the I-V characteristic graph of a P-N junction diode for forward and reverse bias
4. Write a note on frequency dependence of dielectric polarization
5. Explain the principle of X-ray fluorescence
6. What are intrinsic and extrinsic semiconductors?
7. Distinguish between hard and soft magnetic materials.
8. What are Type II superconductors?
9. Discuss the success and failures of classical free electron theory.
10. Explain how the properties of materials change at reduced size

PART - B

Note: Answer any Four questions. **(4x15=60 Marks)**

11. Deduce an expression for inter planar spacing for cubic crystal system?
12. Deduce an expression for equilibrium concentration of Frenkel defects.
13. Explain the salient features of Kronig Penny model and give its significance.
14. Explain the hysteresis curve in ferromagnetic materials.
15. Define Hall effect and derive an expression for Hall co-efficient.
16. Explain in detail the general properties of super conductors.
17. Explain the sol-gel method of preparing nano materials.

****

Code No. 15265/AICTE

FACULTY OF ENGINEERING
B.E. II - Semester (AICTE) (Main) Examination, October 2021

Subject: Mathematics - II

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

Note: i) First Question is compulsory and answer any three questions from the remaining six questions.
ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
iii) **Missing data, if any, may suitably be assumed.**

Answer any four questions from the following. (4x4=16 Marks)

1 a Find the rank of the matrix $A=\begin{bmatrix}1 & 2 & 1\\ 2 & 3 & 4\\ 1 & 3 & -1\\ 8 & 13 & 14\end{bmatrix}$.

b Solve $y\left(2xy+e^{x}\right)dx=e^{x}dy$.

c Solve $\left(D^{2}+9\right)y=\sin 3x$.

d Evaluate $\int_{0}^{\infty} e^{-5x}\left(1-e^{-x}\right)^{7}dx$ in terms of beta function.

e Find $L\left\{t^{3}e^{t}+\sin^{2}t\right\}$.

f Find $L^{-1}\left\{\frac{1}{\left(s^{2}+1\right)\left(s^{2}+3\right)}\right\}$.

g Evaluate $6P_{3}(x)+4P_{2}(x)-16P_{1}(x)$ as a polynomial of x.

(3x18=54 Marks)

2 (a) Find the eigen values and eigen vectors of the matrix $A=\begin{bmatrix}11 & -4 & -7\\ 7 & -2 & -5\\ 10 & -4 & -6\end{bmatrix}$.

(b) Reduce the quadratic form $8x_1^2+7x_2^2+3x_3^2+12x_1x_2+4x_1x_3-8x_2x_3$ into canonical form.

3 (a) Solve $y(x+y)dx-x^{2}dy=0$.

(b) Solve $y(2xy+1)dx+x\left(1+2xy-x^{3}y^{3}\right)dy=0$.

4 (a) Solve $y''+4y=x\cos x$.

(b) Solve $y''+2y'+y=e^{-x}\log x$ by the method of variation of parameters.

5 (a) Find the power series solution of the differential equation $y''+2xy'+y=0$ about the origin.

(b) Evaluate $\frac{d}{dx}\left[erf\left(\alpha x\right)\right]$.

6 (a) Find $L\left\{\int_0^t ue^{-u}\sin 4u\ du\right\}$.

(b) Find $L^{-1}\left\{\frac{1}{s^3\left(s+2\right)}\right\}$.

7 (a) Find the orthogonal trajectories of the family of curves $y^3+3x^2y=c$ where c is arbitrary constant.

(b) Solve $x^2y''-xy'-3y=x^2\log x$.

****

Code No. 15010/AICTE/BL

FACULTY OF ENGINEERING

B.E. II - Semester (AICTE) (Backlog) Examination, October 2021

Subject: Mathematics - II

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

(Missing data, if any, may be suitably assumed)

PART – A

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

1 Obtain the symmetric matrix for the quadratic form $2x_1^2 + 3x_1x_2 + x_2^2$.

2 Show that sum of eigen values of a matrix is its trace and product of eigen values of a matrix is its determinant.

3 Find the integrating factor of the differential equation
$x\frac{dy}{dx} = 2y + x^4 + 6x^2 + 2x,\ x \neq 0$.

4 Define orthogonal trajectory of a given family of curve and write the procedure to find it in polar coordinates.

5 Explain method of variation of parameters.

6 Solve $(D^3 - a^3)y = 0$, where $D = \frac{d}{dx}$.

7 Define Gamma and Beta functions.

8 Express $f(x) = 6x^2 - 5x + 3$ in terms of Legendre polynomials.

9 Find the inverse Laplace transform of the function $\frac{s}{(s+4)^3}$.

10 Find the Laplace transform of the function $f(t) = t^2 e^{3t}$.

PART – B

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

11 (a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ and find A^{-1}, if it exists.

(b) Find rank of the matrix $A = \begin{bmatrix} 1 & 1 & -1 & 1 \\ -1 & 1 & -3 & -3 \\ 1 & 0 & 1 & 2 \\ 1 & -1 & 3 & 3 \end{bmatrix}$.

12 (a) Find the general solution of the differential equation
$y' = y^2 - (2x-1)y + x^2 - x + 1$ if $y = x$ is a solution of the differential equation.

(b) Find the equation of the family of all orthogonal trajectories of the family of circles which pass through the points (2,0), (-2,0).

13 (a) Find the general solution of the equation $y'' + 16y = 32\sec 2x$. using the method of variation of parameters.

(b) Find the general solution of the differential equation $x^2y'' + 4xy' + 2y = 0(x > 0)$.

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

(b) Express $\int_0^1 x^{3/2}\left(1-\sqrt{x}\right)^{1/2} dx$ is terms of Beta function.

15 (a) Use the Laplace transforms to solve the initial value problem $12y'' - 24y' + 9y = 2t,\ y(0) = 0,\ y'(0) = 3$.

(b) Find the inverse Laplace transform of the function $\dfrac{s}{s^2 + 4s + 8}$.

16 (a) Find the general solution of the equation $y'' + 6y = 6\cos x$.

(b) Reduce the quadratic form $2xy + 2yz + 2zx$ into canonical form.

17 Solve $\left(D^3 + 3D^2 - 4D - 12\right)y = e^{2x} + \sin 3x + 4\cos 2x$.

****