CLASS: BTech/IMSC
BRANCH: All/PHYSICS

SEMESTER : II
SESSION : SP/2024

SUBJECT: MA107 MATHEMATICS - II

FULL MARKS: 25

TIME: 02 Hours

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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Q.1(a) Find the Wronskian of xe^x and x.   [2]   1   1
Check whether they are linearly independent or not.

Q.1(b) Solve the following differential equation: [3]   1   2
$$y^{iv} - 3y'' - 4y = 0.$$

Q.2(a) Find the particular solution of :   [2]   1   1
$$(D^2 - 1)y = \cos 2x + a^x$$

Q.2(b) Solve the following differential equation: [3]   1   2
$$[D - 1]^2 y(x) = e^x \sin 2x$$

Q.3 Find the power series solution about $x = 0$ of the differential equation: [5]   2   1
$$y'' - xy' - y = 0$$

Q.4(a) Show that when n is an integer,   [2]   2
$$J_{-n}(x) = (-1)^n J_n(x)$$

Q.4(b) Express x^3 in terms of Legendre polynomials and hence using orthogonality   [3]   2
condition evaluate:
$$\int_{-1}^{1} x^3 P_3(x)dx$$

Q.5 Find the Fourier series representation of a periodic function given by: [5]   3
$1 - x^2, -\pi < x < \pi.$

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