CLASS: IMSC   SEMESTER: III
BRANCH: QEDS   SESSION: MO/2022

SUBJECT: ED201 DIFFERENTIAL EQUATIONS

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL

Q1 (a) For what value of λ, the equation
$(x^3 + 3xy^2)dx + (\lambda x^2 y + y^3)dy = 0$ is an exact differential equation? [2] CO1

(b) Find an integrating factor $\mu(x,y)$ for the differential equation
$y\,dx - x\,dy + 3x^2 y^2 e^{x^3} dx = 0$. [3] CO1
Hence solve the equation.

Q2 Find the general solution and singular solution of the differential
equation [2+3] CO1
$y = px + (b^2 + a^2 p^2)^{\frac{1}{2}}$, where $p = \frac{dy}{dx}$.

Q3 (a) Transform the differential equation $x^2 y'' + 4xy' + 2y = e^x$ into a
differential equation with constant coefficients. [2] CO2
(b) Hence find the complete solution of the given equation. [3] CO2

Q4 (a) If $y = x^2$ is a solution of the equation, $y'' - \frac{2}{x^2}y = 0$, then find the
general solution of equation. [2] CO2
(b) Given that $y_1 = e^x$ and $y_2 = x^2$ are two linearly independent solutions
of the equation $x(x-2)\frac{d^2 y}{dx^2} - (x^2 - 2)\frac{dy}{dx} + 2(x-1)y = 0$. Find the
general solution of the equation [3] CO2
$$x(x-2)\frac{d^2 y}{dx^2} - (x^2 - 2)\frac{dy}{dx} + 2(x-1)y = 3x^2(x-2)^2 e^x$$
by method of variation of parameters.

Q5 Find the general solution of the equation
$$x^2 y'' - (x^2 + 2x)y' + (x+2)y = x^3 e^x$$ [5] CO2
by reducing the equation into a first order differential equation.

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