Code No.15

FACULTY OF ENGINEERING

B.E. II – Semester(Main & Backlog) Examination, May / June 2018

Subject : Engineering Mathematics-II

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

1. Find an integrating factor of $(x^3 + y^3)dx - x^2 ydy = 0$. (2)
2. Obtain the singular solution $y = xy' - \frac{1}{y'}$ (2)
3. Solve $(D^3 - 8)y=0$. (2)
4. Determine whether the functions e^{-x}, e^x. coshx are linearly dependent for $x \in (0, \infty)$. (2)
5. Classify the singular points of the differential equation $x^2y'' + (xcosx)y' + (sinx)y = 0$. (2)
6. Prove that $P_n'(-1) = (-1)^{n-1}\frac{n(n+1)}{2}$ (2)
7. Evaluate $\Gamma\left(\frac{-7}{2}\right)$. (2)
8. If n is an integer, prove that $J_{-n}(x)$ and $J_n(x)$ are linearly dependent. (2)
9. Find the Laplace transform $f(t) = t^2 sinht$. (2)
10. Define Unit step function and Impulse function. (2)

PART-'B'(50 Marks)

11. a) Solve $(y e^{xy} + 4y^3)dx + (xe^{xy} + 12xy^2 - 2y)dy = 0$, $y(0)=2$. (5)

    b) Find the orthogonal trajectories of the family of circles which pass through (0,0) and having centers on the y-axis. (5)

12. a) Find the general solution of $y'' - 6y' + 13y = 2e^{3x} sinx\ cosx$. (5)

    b) Solve $x^3y'''+6x^2y''-12y=\frac{12}{x^2}$. (5)

13. Find the series solution of $2x(1 - x)y'' + (1 - x)y' + 3y = 0$ about x = 0 by Frobenius method. (10)

14. a) Evaluate $\int_0^a \frac{x^{3/2}}{\sqrt{a^2 - x^2}}dx$ using Beta and Gamma functions. (5)

    b) Express $J_2'(x)$ in terms of $J_o(x)$ and $J_1(x)$. (5)

15. a) Find the inverse Laplace transform of $\frac{s}{s^4 + s^2 + 1}$. (5)

    b) Apply Laplace transform to solve $y'' + 2y' - 3y = 0$, $y(0) = 0$, $y'(0)= 4$. (5)

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16. a) The number N of bacteria in a culture grew at a rate proportional to N. the value of N was initially 50 and increased to 150 in one hour. What would be the value of N after $1\frac{1}{2}$ hrs. ? (5)

b) Solve y''+y=e^{-x} by the method of variation of parameters. (5)

17. a) Prove that $\int_{-1}^{1} P_n^2(x)dx = \frac{2}{2n+1}$ and hence evaluate $\int_{-1}^{1} P_{10}^2(x)$. (5)

b) Find $L\left[\int_0^t \frac{1-e^{-u}}{u} du\right]$ (5)

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