Code No: 11377/CBCS/BL

FACULTY OF ENGINEERING

B.E. II – Semester (CBCS) (Backlog) Examination, May / June 2019

Subject: Engineering Mathematics – II

Time: 3 Hours **Max. Marks: 70**

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

PART – A (10x2 = 20 Marks)

1) Solve $\left(x - y^2\right) dx + 2xydy = 0$.

2) Find the orthogonal trajectories of the family of curves $ay^2 = x^3$ where 'a' is a parameter.

3) Find the particular integral of $\left(D^4 - m^4\right)y(x) = \sin mx$ ($where\ D = \frac{d}{dx}$).

4) Find a particular integral of $\left(D^2 - 2D + 1\right) y(x) = x^3 e^x \left(where\ D = \frac{d}{dx}\right)$.

5) Determine the nature of the point $x = 0$ for the equation $xy'' + y \sin x = 0$

6) Evaluate $18P_3(x) + 6P_2(x) - 7P_o(x)$ as a polynomial of x.

7) Evaluate $\Gamma(-\frac{5}{2})$

8) Evaluate $J_2(x)$ in terms of $Jo(x)$ and $J_1(x)$.

9) Find $L\{t\cos 2t\}$.

10) Evaluate $-\overset{-1}{L}\left\{\frac{2}{S^3} + \frac{1}{S^2}\right\}$.

PART – B (50 Marks)

11. a) Solve $x\frac{dy}{dx} + 3y = x^3 y^2$. 5

b) Find the general solution of the differential equation $y = xp - p^3$ where $p = \frac{dy}{dx}$ 5

12. a) Find the general solution of the differential equation $y'' + 2y' + 2y = e^{-x} \cos x$. by using the method of variations of parameter. 5

b) Find the general solution of $x^2 y'' - 3xy' + 5y = \sin(\log x)$. 5

13. Using Frobenius method, find the series solution of $x\ y'' - (1 + x)y' - 2y = 0$. 10

14. a) Evaluate $\frac{d}{dx}\left[erf(\sim x)\right]$. 5

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

contd…2

15. a) Evaluate $L^{-1}\left\{\log\left(\frac{s-3}{s+3}\right)\right\}$. 5

    b) State convolution theorem for Laplace transform. 2

    c) Evaluate $t * e^{at}$ using Laplace Transformation. 3

16. a) A metal bar at a temperature 100^{o} is place in a room at a constant temperature of 0^{o}C. If after 20 minutes the temperature of the bar is half, find an expression for the temperature of the bar at any time. 5

    b) Show that $nP_n(x) = xP'_n(x) - P'_{n-1}(x)$ 5

17. a) Using Laplace transform, solve the initial value problem $y'' + y = e^{t}Sin(t)$, $y(0) = 0 = y'(0)$. 5

    b) Show that $(m,n) = \int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}dx$. 5

****