

FACULTY 01? ENGINEERING & INFORMATICS
B.E. 1 Year (New) (Common to all Branches) (Main) Examination, June 2011
MATHEMATICS - IV

Time : 3 Hours]

[Max. Marks : 75

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

PART - A

(Marks 25)

1. Eliminate the arbitrary constants from
 $y = a e^x + b e^{2x}$
 and form differential equation. 2
2. Solve, $(3x^2 + 2eY)dx + (2xeY + 3y^2)dy = 0$.
3. Show that the set of function $x^{-1/2}$ from series' of the equation
 $x^2 y'' + xy' - y = 0$ 3
 Solve $y'' - y(0) = 0, y'(0) = 2$. 2
- Z. Define singular and regular singular points. 2

 Show that $P_2(u) = \frac{1}{2} (3u^2 - 1)$ 3

 Find the value 'of' $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

8. Find the solution of the differential equation $x^2 y'' + Ay' + \left(x^2 - \frac{1}{16}\right)y = 0$ in terms of Besselis function: 3
9. Find Laplace transform of $t \sinh t$. 2
10. Find inverse Laplace transform of
 $\frac{6 + 2}{s^2 - 4s + 3}$

PART - B

(Marks 5 x 10 = 50)

11. (a) Find the integrating factor and hence solve the differential equation
 $(x^2 + y^2) dx - 2xy dy = 0$ 5
 (b) Show that the family of curves
 $\frac{y^2}{c^2 + 2} + 1 = z^2$, is self orthogonal. 5

(This paper contains 2 pages)

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12. (a) Find the general and the singular solution of Clairaut's equation
 $Y = xY' + (Y')^3$. 5
- (b) Solve the critical value problem 5
 $y'' + 3y' - 4y = 0, y(0) = 1, y'(0) = 0, y''(0) = 1/2$.
13. (a) Find the general solution of $y'' + 3y' + 2y = 2e^x$. 5
- (b) If $y = e^2x$ is the one of the solutions of $y'' - 6y = 0$, find other solution by reducing the order of the differential equation. 5
14. Find the series solution about $x=0$, of the differential equation $x(1+x)y'' + 3xy' + y = 0$. 10
15. (a) Prove that :
 $(n+1)p_{n+1}(x) = (2n+1)x p_n(x)$ 5
- (b) Prove that $A(m; 14) = 2^{2m-1} \beta(m)$ 5
16. (a) Express the integral $\int_0^x \frac{dx}{\sqrt{1-x^2}}$ in terms of Gamma functions.
- (b) Prove that $\int_0^x \frac{x^{2n}}{(x^2+1)^{n+1}} dx = \frac{1}{2^{n+1}} \sum_{j=0}^n \binom{n}{j} (-1)^j x^{2j+1}$ 5
17. (a) Using convolution theorem, evaluate $L^{-1} \left\{ \frac{1}{s(s+1)} \right\}$ 5
- (b) Solve $\frac{dy}{dt} + 2y = \sin t$, $y = 0$, when $t = 0$, using Laplace transform. 5