

FACULTY OF ENGINEERING & INFORMATICS
B.E. I-Year (Common to AD) (Main) Examination, June 2013

 Subject : **Mathematics - II**

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part -B.
PART - A (25 Marks)

1. Form the differential equation by eliminating the arbitrary constant X from $x^2 + y^2 + 2Xx = 0$. (2)
2. Solve $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$ (3)
3. Solve $y'' - y = 0$, $y(0) = 0$, $y(1) = 2$ (3)
4. Find the particular integral of $(D^2 - 1)y = 8e^{3x}$ (2)
5. Find the Laplace transform of $\sin 2t \sin 3t$. (2)
6. Find the inverse Laplace transform of $\frac{2s-5}{s^2-4}$ (3)
7. Show that $P_n(1) = 1$. (2)
8. Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ (3)
9. Evaluate $\int x^2 e^{-x} dx$ (2)
10. Show that $\int_0^{n-1} f(x) dx = \frac{1}{n} [f(0) + f(1) + \dots + f(n-1)]$ (3)

PART - B (5x10=50 Marks)

11. (a) Solve $(3x^2y^3e^{4y^3+y^2})dx + (x^3y^3e^{y-yx})dy = 0$ (5)
 (b) Solve $\frac{dy}{dx} - y^2 = \sin x + \cos x$. (5)
12. (a) Find the general solution and singular solution of the Clairaut's equation $Y = xY' - (Y')^3$. (5)
 (b) Solve the initial value problem $y''' - 5y'' + 7y' - 3y = 0$, $y(0) = 1$, $y'(0) = 0$, $y''(0) = -5$. (5)
13. (a) Solve by method of variation of parameters $(D^2 + 4)y = \tan 2x$. (5)
 (b) Solve $y'' - 4y' + 13y = 12e^{2x} \sin 3x$. (5)
14. Find the series solution about $x=0$ of the differential equation. $(1 - x^2)y'' - 2xy' + 2y = 0$ (10)
15. (a) Prove that $\int_0^1 P_m(x)P_n(x)dx = \frac{1}{2m+1}$ if $m=n$ and 0 if $m \neq n$.
 (b) Find the Laplace transform of $t \sin^2 3t$.
16. (a) Apply convolution theorem to evaluate $L^{-1} \left\{ \frac{s}{(s^2+4)(s^2+9)} \right\}$
 (b) Find the inverse Laplace transform of $\frac{2s^2-4}{(s+1)(s-2)(s-3)}$
17. (a) Show that if $- =$ (5)
 (b) Prove that $T_{n+1}(2) - 2xT_n(X) + T_{n-1}(X) = 0$ (5)