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EIS-51

B.E. (IIIrd Sem.) (CGPA) (CSE) Examination-2015

MATHEMATICS-II

Paper : CS-301

Time Allowed : Three Hours
Maximum Marks : 60

Note : Attempt all questions.
Each question carry equal marks.

Q.I Solve any two of the following—

(a) Solve $\frac{dy}{dx}+2y\tan x=\sin x$, given that $y=0$, when $x=\frac{\pi}{3}$.

(b) Solve —

$$(x^2+y^2+2x)dx+2y\,dy=0$$

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(c) Solve $x^2p^3+y(1+x^2y)p^2+y^3p=0$ where $p\equiv\frac{dy}{dx}$.

(d) Solve $(x^2-a^2)P^2-2xyP+y^2-b^2=0$ where $P\equiv\frac{dy}{dx}$.

Q.II Solve any two—

(a) Solve —

$$\frac{d^3y}{dx^3}-3\frac{d^2y}{dx^2}+9\frac{dy}{dx}-27y=\cos 3x$$

(b) Solve—

$$\frac{d^2y}{dx^2}+4y=x^2+\cos^2 x$$

(c) Solve $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=0$, given that $x+\frac{1}{x}$ is one integral.

(d) Solve $\frac{d^2y}{dx^2}-2\tan x\frac{dy}{dx}+5y=\sec x.e^x$

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Q.III Solve any two —

(a) Change the order of integration of the $\int_0^3 \int_1^{\sqrt{4-y}} (x+y)\, dx\, dy$.

(b) Evaluate $\iint_R x\, y\, dx\, dy$, over the region in R the positive quadrant for which $x+y \le 1$.

(c) Prove that $\int_0^1 x^5 \left(1-x^3\right)^{10} dx = \frac{1}{262}$.

(d) Evaluate $\int_0^1 \left\{\log \frac{1}{y}\right\}^{n-1} dy$

Q.IV Solve any two of the following—

(a) Prove that $L\left\{\sin\sqrt{t}\right\} = \frac{\sqrt{\pi}\, e^{-1/4S}}{2S^{3/2}}$

(b) Find the Laplace transform of $\int_0^t \frac{\sin t}{t}\, dt$

(c) Find $L^{-1}\left\{\frac{5S+3}{(S-1)\left(S^2+5S+6\right)}\right\}$

(d) Solve the differential equation by Laplace transformation method $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 4t + e^{3t}$, when $y(0)=1$ and $y'(0)=-1$.

Q.V Solve any two of the following—

(a) Find the Fourier series to represent $x - x^2$ from $-\pi$ to π.

(b) Find the Fourier series to represent the function, if—

$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$

(c) Express $f(x) = x$ as a half range sine series in $0 < x < 2$.

(d) Find the Fourier series as far as the second harmonic to represent the function given by the following table—

x :	0	1	2	3	4	5
$y = f(x)$:	4	8	15	7	6	2

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