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CSE

322351(14)

B. E. (Third Semester) Examination, Nov.-Dec. 2015

(New Scheme)

(CSE Engg.)

MATHEMATICS-III

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *All questions are to be attempted. Part (a) of each question is compulsory having 2 marks and solve any two parts from remaining parts (b), (c) and (d) of each questions having 7 marks.*

Unit-I

1. (a) Write Euler's formulae for Fourier Series.

(b) Obtain the fouriers series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.

(c) Find the fourier series expansion of

$f(x) = 2x - x^2$ in (0, 3) and hence deduce that :

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots\dots\dots \infty = \frac{\pi}{12}$$

(d) Obtain the first three coefficients in the fourier cosine series for *y*, where *y* is given in the following table :

x	:	0	1	2	3	4	5
y	:	4	8	15	7	6	2

Unit-II

2. (a) Find the Laplace transform of :

$$e^{-3t}\,(2\cos 5t - 3\sin 5t)$$

(b) Evaluate :

$$L\left\{t\int_0^t \frac{e^{-t}\sin t}{t}\,dt\right\}$$

(c) Find :

$$L^{-1}\left\{\cot^{-1}(5/2)\right\}$$

(d) Solve :

$$\frac{d^2x}{dt^2} + 9x = \cos 2t \text{ if } x(0) = 1,\ x(\pi/2) = -1$$

Unit-III

3. (a) State Cauchy's theorem.

(b) Prove that the function $f(z)$ defined by :

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}\ (z \neq 0),\ f(0) = 0$$

is continuous and the *C-R* equations are satisfied at the origin, yet $f'(0)$ does not exist.

(c) Evaluate using Cauchy's integral formula :

$$\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}\, dz$$

where C is the circle $|z| = 3$.

(d) Expand $f(z) = \dfrac{1}{(z-1)(z-2)}$ in the region :

(i) $|z| < 1$

(ii) $1 < |z| < 2$

(iii) $|z| > 2$

Unit-IV

4. (a) Derive a partial differential equation from the equation :

$$2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

(b) Solve :

$$\frac{\partial^3 z}{\partial x^2 \partial y} + 18\, xy^2 + \sin(2x - y) = 0$$

(c) Solve :

$$4\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 16 \log(x + 2y)$$

(d) Using the method of separation of variables solve :

$$\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u \text{ where } u(x, 9) = 6\, e^{-3x}.$$

Unit-V

5. (a) Write application of Binomial Distribution.

(b) A random variable X has the following probability function :

x :	0	1	2	3	4	5	6	7
$p(x)$:	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

(i) Find the value of the k.

(ii) $P(0 < X < 5)$.

(c) Fit a Poisson distribution to the set of observations :

x	:	0	1	2	3	4
f	:	122	60	15	2	1

(d) Fit a normal curve to the following distribution :

x	:	2	4	6	8	10
f	:	1	4	6	4	1