

Roll No

BE-3001 (CS/IT) (CBGS)**B.E., III Semester**

Examination, May 2018

Choice Based Grading System (CBGS)**Mathematics - III***Time : Three Hours**Maximum Marks : 70*

- Note:** i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Obtain a Fourier series to represent e^{-ax} from $x = -\pi$ to $x = \pi$.

b) Expand $f(x) = \frac{1}{4} - x$, if $0 < x < \frac{1}{2}$,
 $= x - \frac{3}{4}$, if $\frac{1}{2} < x < 1$,

as a Fourier series of sine terms.

2. a) Find the Fourier transform of

$$f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$$

Hence evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$.

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- b) Solve by using Laplace transform the ordinary differential equation

$$y''' + 2y'' - y' - 2y = 0$$

given that $y(0) = y'(0) = 0$ and $y''(0) = 6$.

3. a) Find the Laplace transform $e^{-4t} \frac{\sin 3t}{t}$

- b) Using the convolution theorem, find

$$L^{-1} \left\{ \frac{s^2}{(s^2 + a^2)(s^2 + b^2)} \right\}, a \neq b.$$

4. a) Define with examples discrete and continuous random variables.

- b) Find the mean and variance for Poisson distribution.

5. a) Find the Binomial distribution whose mean is 4 and variance is 3. Also find its mode.

- b) For some normal distribution the first moment about 10 is 40 and fourth moment about 50 is 48. What is the mean, variance and S.D. of the normal distribution.

6. a) Fit a straight line to the following data.

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	5

- b) The profit of certain company in the x the year of its life are given by:

x	1	2	3	4	5
y	1250	1400	1650	1950	2300

Taking $u = x - 3$ and $50v = y - 1650$, show that parabola of second degree of y on x is

$$y = 1140.05 + 72.1x + 32.15x^2.$$

7. a) Obtain Fourier series of the function

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

and hence show that $1 - \frac{1}{4} + \frac{1}{9} - \frac{1}{16} + \dots = \frac{\pi^2}{12}$

- b) Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$ and

hence find Fourier sine transform of $F(x) = \frac{x}{1+x^2}$.

8. a) In a Poisson distribution with unity mean, show that the mean deviation from mean is $\frac{2}{e}$ times the standard deviation.

- b) Evaluate by using Laplace transform

i) $\int_0^{\infty} t e^{-3t} \sin t \, dt$

ii) $\int_0^{\infty} e^{-t} \frac{\sin t}{t} \, dt$
