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Roll No .....

BE-3001 (CS/IT)-CBGS

B.E., III Semester

Examination, June 2020

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) Find the Fourier series for $f(x) = x^2$ in $-\pi < x < \pi$.

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

2. a) Find the Fourier transform of $f(x) = \begin{cases} x & , |x| \le a \\ 0 & , |x| > a \end{cases}$

   b) Find the Fourier cosine transform of the $f(x) = e^{-3x} + e^{-4x}$.

3. a) Find $L\{\sin 3t \cos 2t + t^{3/2} - 5e^{-2t} + 6\cos 3t\}$

   b) Find $L\{e^{-4t}(\sin 2t + \cos 2t)\}$

4. a) Find $L\left\{\frac{1-\cos 2t}{t}\right\}$

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

5. a) Evaluate $L^{-1}\left\{\frac{6s^2+22s+18}{(s+1)(s+2)(s+3)}\right\}$

   b) Solve $\frac{d^2y}{dt^2}+6\frac{dy}{dt}+9y=\sin t$, given that $y=1, \frac{dy}{dt}=0$ when $t=0$.

6. a) If $f(x)=cx^2$, $0<x<1$, find the value of C and determine the probability that $\frac{1}{3}<x\frac{1}{2}$.

   b) A continuous random variable X has the density function $f(x)=3x^2$, $0 \le x<1$, find a and b when

   i) $P(X \le a)=P(X>a)$

   ii) $P(X>b)=0.05$.

7. a) Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six?

   b) Fit Poisson's distribution to the following and calculate theoretical frequencies ($e^{-0.5}=0.61$):

Deaths:	0	1	2	3	4
Frequency:	122	60	15	2	1

8. a) Find the mean and variance of the Binomial distribution.

   b) Fit a second degree parabola to the following data regarding x as an independent variable:

x :	0	1	2	3	4
y :	1	5	10	22	38

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