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**MA-220(CS/IT/EC)-CBCS**

**B.E., III Semester**

Examination, June 2020

**Choice Based Credit System (CBCS)**

**Mathematics - III**

*Time : Three Hours*

*Maximum Marks : 60*

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

1. a) Obtain Fourier series for  $f(x) = x^2$  in the interval  $-\pi < x < \pi$ .  
b) Find the half-range sine series for the function  $f(x) = x$  in the interval  $0 \leq x \leq \pi$ .
2. a) Find mean and variance of Poisson distribution.  
b) Write a short note on random variables, their types and probability distribution.

3. Prove that

$$x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}, \quad -\pi < x < \pi$$

Hence show that  $\sum \frac{1}{n^2} = \frac{\pi^2}{6}$

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4. Evaluate:

a)  $\int_0^{\infty} t^3 e^{-t} \sin t dt$       b)  $\int_0^{\infty} \frac{e^{-t} \sin^2 t}{t} dt$

5. a) Find mean and variance of binomial distribution.

b) Fit a second degree parabola to the following data:

x:	0	1	2	3	4
y:	1	1.8	1.3	2.5	6.3

6. 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

OR

Show that the mean deviation from the mean of the normal

distribution is  $\frac{4}{5}$  times its standard deviation.

7. 100 tablets are found defectives in a lot of 5000 tablets. Find the probability that at most 3 tablets are defective in a box of 100 tablets.

OR

The mean height of 500 students is 151cm and standard deviation is 15cm. Assuming that heights are normally distributed. Find how many students have heights between 120 and 155cm.

[Given that  $f(0.27) = 0.1064$  and  $f(2.07) = 0.4808$ ]

8. Write a short note on the followings:

i) Regression analysis

ii) Normal distribution

OR

Six coins are tossed 6400 times. Using the binomial distribution, find the approximate probability of getting six head  $x$  times.

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