G 1789 (Pages : 3) Reg. No..............................

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B.TECH. DEGREE EXAMINATION, MAY 2015

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS – III

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

{Common to all Branches}

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 marks.

1. Find the Fourier series of $f(x) = x^2$ in $(0, 2l)$.
2. Write down Fourier cosine and sine integral representations of $f(x)$.
3. Form the partial differential equation by eliminating f from $Z = e^{ay}(f(x+by))$.
4. In eight throws of a die, the appearance of '5' or '6' is considered a success. Find the mean and standard deviation.
5. Define Null hypothesis and alternative hypothesis.

(5 × 3 = 15 marks)

Part B

Each question carries 5 marks.

6. Find the Fourier series of $f(x) = \begin{cases} 0, & -\pi \le x \le 0 \\ \sin x, & 0 \le x \le \pi. \end{cases}$
7. Find the Fourier transform of unit impulse function.
8. Solve $p^2 + q^2 = 4pq$.
9. Show that in a Poisson distribution with mean 1. Mean deviation about the mean is $\frac{2}{e}$.
10. If $\bar{X}$ is the mean of a random sample of size 'n' taken from a normal population with mean μ and variance 100, find n such that $p(\mu - 5 < \bar{X} < \mu + 5) = 0.954$.

(5 × 5 = 25 marks)

Turn over

Part C

Each question carries 12 marks.

11. Find the Fourier series expansion of period 2 for the function :

$$f(x)=\begin{cases}\pi x, & 0\le x\le 1\\ \pi(2-x), & 1\le x\le 2\end{cases}\quad \text{and deduce } \sum_{n=1,3}^{\infty}\left(\frac{1}{n^2}\right).$$

Or

12. Find the Fourier series of $f(x)=x(1-x)(2-x)$ in (0, 2). Deduce the sum of :

$$\frac{1}{1^3}-\frac{1}{3^3}+\frac{1}{5^3}-\frac{1}{7^3}+\dots$$

13. Find the Fourier transform of :

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

hence show that $\int_0^{\infty}\frac{\sin^2 x}{x^2}=\frac{\pi}{2}$.

Or

14. Find the Fourier integral representation of :

$$f(x)=\begin{cases}1, & |x|\le 1\\ 0, & |x|>1\end{cases}\quad \text{hence evaluate } \int_0^{\infty}\frac{\sin\lambda\cos\lambda x}{\lambda}\,d\lambda.$$

15. Solve $9pqz^4=4\left(1+z^3\right)$.

Or

16. Solve $p^2+x^2y^2q^2=x^2z^2$.

17. Fit a Poisson distribution to the following data :

x :	0	1	2	3	4	5
f :	142	156	69	27	5	1

Or

18. In a certain exam the percentage of candidates passing and getting distinction were 55 and 9 respectively. Estimate the average marks obtained by the candidates, the minimum marks for pass and distinction being 44 and 75 respectively.

19. In a random sample of size 500 the mean is found to be 20. In another independent sample of size 400, the mean is 15. Could the samples have been drawn from the same population with S.D. 4.

Or

20. Two independent samples from the normal population gave the following results :

Sample		Size	Mean	S.D.
I	..	16	23.4	2.5
II	..	12	24.9	2.8

(5 × 12 = 60 marks)