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Reg. No. 14014424.....

Name..Subin Varghese

B.TECH. DEGREE EXAMINATION, MAY 2016

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

{Common for all branches}

Time : Three Hours

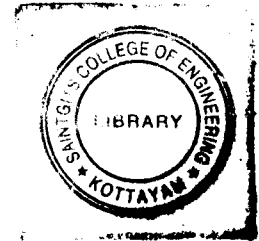
Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Find the fourier series of $f(x) = x(2l - x)$ in $(0, 2l)$.
2. Find the Fourier Cosine Transform of e^{-ax} . ($a > 0$).
3. Form the partial differential equation by eliminating the arbitrary function 'f' from $f(z - xy, x^2 + y^2) = 0$.
4. Find the binomial distribution which has mean 2 and variance $4/3$.
5. Define type I and type II error.



(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Find the Fourier series expansion of $f(x) = x^2 + x$ in $(-2, 2)$.
7. Find the Fourier transform of unit step function.
8. Solve $x^4 p^2 - yzq - z^2 = 0$.
9. A random variable X has a Poisson distribution of $\sqrt{2}$ $P(X \leq 1) = P(X \leq 2)$ find $P(X = 0)$.
10. A random sample is taken from a normal population with mean 30 and standard deviation 4. How large a sample should be taken of the sample is to be between 25 and 35 with probability 0.98 ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. Find the Fourier series
- $f(x) = |\cos x|$
- in
- $-\pi \leq x \leq \pi$
- .

Or

12. Find the Fourier series expansion of:

$$f(x) = \begin{cases} 1, & 0 < x < 1 \\ 2, & 1 < x < 3. \end{cases}$$

13. Find the Fourier Transform of
- $f(x)$
- if:

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

Hence prove that $\int_0^{\infty} \frac{\sin^4 x}{x^4} dx = \frac{\pi}{8}$.

Or

14. Find
- $f(x)$
- if its Fourier sine transform is
- $\frac{s}{s^2 + 1}$
- .

15. Solve
- $z^2(p^2 + q^2 + 1) = c^2$
- .

Or

16. Solve
- $(pq - p - q)(z - px - qy) = pq$
- .

17. In a normal distribution 7% of the items are under 35 and 10% of the items are above 55. Calculate the mean and variance.

Or

18. Fit a Binomial distribution to the following frequency distribution:

x	:	0	1	2	3	4	5	6
f	:	13	25	52	58	32	16	4

19. Two independent samples of size 7 and 8 items here the following values:

Sample I : 10 12 10 14 10 9 8

Sample II : 9 11 11 13 15 9 12 14

Do the estimates of means of population differ significantly at 5% level of significance.

Or

20. The mean life time of a sample of 9 items is 49.11 and standard deviation 2.47. Does this mean value differ significantly from the assured mean value 47.5.

(5 × 12 = 60 marks)

