Total No. of Questions – [ 4 ] Total No. of Printed Pages 2

| G.R. No. | |
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Paper Code - U218-131 (T2)

**OCTOBER 2018/ IN-SEM (T2)**

**S. Y. B. TECH. (E & TC ENGINEERING) (SEMESTER - I)**

**COURSE NAME: Engineering Mathematics III**

**COURSE CODE: ETUA21171**

**(PATTERN 2017)**

Time: [**1Hour**] [Max. Marks: **30**]

**(*) Instructions to candidates:**

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1)

a) The first four moments of a distribution about the value 4 are -1.5, 17, -30 and 108. Calculate the first four moments about the mean and comment upon the skewness and kurtosis. Also find mean and standard deviation.

[6 marks]

b) Find correlation coefficient between x and y for the following data

| X | 1 | 3 | 4 | 6 | 8 | 9 | 11 | 14 |
|---|---|---|---|---|---|---|---|---|
| Y | 1 | 2 | 4 | 4 | 5 | 7 | 8 | 9 |

[6 marks]

c) A random sample of 200 bolts is drawn from a population which represents the size of bolts. If a sample is distributed normally with a mean 3.15 cm and standard deviation 0.025 cm, find expected number of bolts whose size falls between3.12 cm and 3.2 cm. (Given: For z=1.2 area A=0.3849, z=2 area A=0.4772). [4 marks]

**OR**

Q.2)

a) For the following distribution find first four moments about the mean .Also find $\beta_1$ & $\beta_2$

| X | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |
|---|---|---|---|---|---|---|---|
| F | 4 | 36 | 60 | 90 | 70 | 40 | 10 |

[6 marks]

b) The regression line of y on x is 4x-5y+33= 0 and regression line of x on y is 20x -9y = 107.The value of variance of x is 9. Find

1) The mean value x and y 2) The correlation coefficient between x and y.
3) The standard deviation of y. [6 marks]

c) In a certain factory turning out razor blades there is a small chance of 1/500 for any blade to be defective. The blades are supplied in a packet of 10. Calculate approximate number of packets containing no defective and 2 defective blades in a consignment of 10,000 packets. [4 marks]

Q.3)

a)If the vector field $\bar{F} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ is irrotational , find a, b, c and hence find corresponding scalar field $\phi$ such that $\bar{F} = \nabla\emptyset$ [6 marks]

b) Find directional derivative of $xy^2 + yz^3$ at (2,-1,1) along the line 2(x-2) = (y+1) = (z-1) [4 marks]

c) Show that $\nabla^4(r^2 \log r) = \frac{6}{r^2}$ [4 marks]

**OR**

Q.4)

a) Find the constants a & b, so that the surface $ax^2 - byz = (a + 2)x$ will be orthogonal to the surface $4x^2y + z^3 = 4$ at the point (1,-1,2) [6 marks]

b) Show that $\nabla\left(\frac{\bar{a}.\bar{r}}{r^n}\right) = \frac{\bar{a}}{r^n} - \frac{n(\bar{a}.\bar{r})}{r^{n+2}}\bar{r}$ [4 marks]

c) In what direction, directional derivative of $x^2yz^3$ is maximum from the point $(2,1,-1)$ . Also find magnitude of this maximum .

[4 marks]

##end##