

MAY 2014

P/ID 17508/PCASH

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

All questions carry equal marks.

1. Define sample space. Write down the sample space in the experiment of testing the life time of an electrical equipment knowing that it works to a minimum of 1800 hours.
2. What is co-efficient of variation? How do you compare two different sets of data using this measure?
3. Write down the probability density function of the Gamma (α, β) distribution. If its mean and variance are respectively 4 and 12 find α and β .
4. Describe the procedure of fitting the equation $y = ax^2 + bx + c$ to the information given about x and y .
5. What is meant by simple random sample? Explain any one of the methods of drawing such sample.
6. Define interval estimator. Interpret the 95% confidence interval $[T_1(\underline{x}), T_2(\underline{x})]$ of the parameter $\gamma(\theta)$ where $T_1(\underline{x})$ and $T_2(\underline{x})$ are two statistics such that $T_1(\underline{x}) < T_2(\underline{x})$ for any given sample \underline{x} .

7. What are the basic principles of scientific experimentation? Explain any two of them.

8. Explain the components of a Time Series Analysis.

PART B — ($7 \times 10 = 70$ marks)

Answer any SEVEN questions.

All questions carry equal marks.

9. Three containers, viz. C1, C2 and C3, of PCs were received in a cargo ship. C1 consists 25 PCs with i5 technology and 20 PCs with i7 technology. C2 consists 15 PCs with i5 technology and 22 PCs with i7 technology. C3 contains 18 PCs with i5 technology and 12 PCs with i7 technology. One container was selected randomly and one PC was selected randomly from that container. Given that the selected PC is with i7 technology, what is the probability that it is selected from C1. Assume that the probabilities for selecting C1, C2 and C3 are respectively 0.28, 0.38 and 0.34.

10. If the probability density function of a random variable x is defined as

$$f(x) = \begin{cases} 1/5, & \text{for } 0 < x \leq 5 \\ 0, & \text{otherwise,} \end{cases}$$

Find the moment generating function of the distribution. Also calculate its co-efficient of variation.

11. Suppose that the life times of certain kinds of electronic devices have a mean of 300 hours and standard deviation of 25 hours. If the distribution of the life times is approximately a normal distribution,

- (a) calculate the probability that any one of these devices will have a life time of atleast 350 hours;
- (b) find among 300 devices, the number of devices will have life times from 220 to 260 hours.
12. A manufacturer of pins knows that on an average 5% of his product is defective. He sells pins in boxes of 100, and guarantees that not more than 4 pins will be defective.
- (a) What is the probability that a box will meet the guaranteed quality?
- (b) What is the probability that a box will fail to meet the guaranteed quality? ($e^{-5} = 0.0067$).
13. Calculate the co-efficient of correlation, using Karl Pearson's formula from the following data :
- Cost : 39 65 62 90 82 75 25 98
- Sales : 47 53 58 86 62 68 60 91
14. Based on the following data, calculate $R_{1.23}$ and $r_{23.1}$:
- $r_{12} = 0.6 \quad r_{13} = 0.7 \quad r_{23} = 0.63$.
15. A random sample of 500 apples was taken from a large consignment and 60 were found to be bad. Obtain the 98% confidence limits for the percentage number of bad apples in the consignment?

$$\left[\int_0^{2.33} \phi(t) dt = 0.49 \text{ nearly} \right].$$

16. The following are two independent random samples drawn from two normal populations.

Sample-1: 20 16 26 27 23 22 18 24 25 19

Sample-2: 27 33 42 35 32 34 38 28 41 43
30 37

Test whether :

- (a) population variances are equal, and
- (b) population means are equal. Let $\alpha = 5\%$.

17. The data on prices (Rs. per kg) of a certain commodity during 2000 and 2004 are shown below :

Quarter	Years				
	2000	2001	2002	2003	2004
I	45	48	49	52	60
II	54	56	63	65	70
III	72	63	70	75	84
IV	60	56	65	72	66

Compute the seasonal indices by average method and obtain the deseasonalized values.

18. Discuss the advantages and disadvantages of Randomised Block Design.