

Reg. No. :

Code No. 1020

Name :

Second Year – March 2016

Time : 2 Hours
Cool-off time : 15 Minutes

Part – III

STATISTICS

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'cool-off time' of 15 minutes in addition to the writing time of 2 hrs.
- You are not allowed to write your answers nor to discuss anything with others during the 'cool-off time'.
- Use the 'cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub-questions must be answered from the same question itself.
- Calculations, Figures and Graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

നിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. ഈ സമയത്ത് ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയവിനിമയം നടത്താനോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്തു കഴിഞ്ഞാൽ ഉപചോദ്യങ്ങളും അതേ ചോദ്യനമ്പറിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കുട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

1. Find the derivative of the following :

$$y = \log(1+x), y = \frac{1}{x^5}$$

(Scores : 2)

2. The marginal cost associated with the production of 'x' units of a firm is $MC = .79 - 15x + 1.2x^2$. If the firm spend an amount of ₹ 600 as fixed cost, what will be the total cost of the firm ?

(Scores : 2)

3. A random variable X having probability density function

$$f(x) = 3x^2, 0 \leq x \leq 1$$

find the value of 'a' such that $P[X \leq a] = P[X \geq a]$

(Scores : 3)

Fill in the blank :

4. The height of person in a city is a random variable of _____ type. (Score : 1)

5. If X and Y are two independent random variables, then $E(XY) = \underline{\hspace{2cm}}$. (Score : 1)

6. (a) In which situations Binomial Distribution can be applied ? (Scores : 2)

(b) A tool manufacturing company claims that the chance for a tool to be defective is $\frac{1}{200}$. If 10 items are chosen what is the chance that three are defective ? (Scores : 2)

7. A bottling plant has observed that the amount of soda content in each bottle is normally distributed with a mean of 32.2 ml and a SD of .3 ml. If a customer buys a packet of 4 bottle, what is the probability that the mean content of the four bottle will be greater than 32 ml ? (Scores : 3)

Fill in the blank :

8. If X and Y are independent chi-square variate then ratio of X and Y is _____. (Score : 1)

Answer any **one** from **9** and **10**.

9. The number of pages can be printed by a laser printer is normally distributed with a mean of 11500 pages and a SD of 500 pages. If 5 such printers are selected, what is the probability that 3 of them will print more than 12000 pages ? **(Scores : 4)**

OR

10. The amount of money that 500 students can earn in summer vacation is assumed to be normally distributed with mean of ₹ 450 and SD of ₹ 100. How many students can earn between ₹ 400 and ₹ 500 ? **(Scores : 4)**

Choose the correct answer.

11. A normal distribution is
- (a) Positively skewed
 - (b) Negatively skewed
 - (c) Symmetric
 - (d) Discrete **(Score : 1)**
12. (a) A population consists of the values 6, 8, 10, 13, 15. Consider all the possible sample of size 2 that can be drawn without replacement. Show that sample mean is an unbiased estimate of the population mean. **(Scores : 3)**

- (b) Choose the correct answer.

If x_1, x_2, \dots, x_n is a random sample from $N(0, \sigma^2)$ population, then the sufficient estimate of σ^2 is

- (a) $\sum x_i$
- (b) $\sum x_i^2$
- (c) $(\sum x_i)^2$
- (d) None of these **(Score : 1)**

Answer any **one** from **13** and **14**.

13. A food production company ensuring that, the label on the packets stating “the content have a net weight of 20 gm” must have a weight of at least 20 gm. The food inspector selected 10 packets and measured their weight as follows :

19.8, 20, 19.2, 20.3, 19.7, 19.5, 19, 20.3, 20.9, 20.1

If the weight of all the packets follows normal distribution with SD .4 gm, can he conclude that the products are unacceptable at 1% level of significance ? **(Scores : 4)**

OR

14. A Manager of a departmental store is thinking to introduce a new billing system. After the analysis of their accounts he determines that the new system will be cost effective only if the mean daily accounts is more than ₹ 1,700. A sample of 400 accounts has mean of ₹ 1,780. If the accounts shows a normal distribution with SD of ₹ 65, can he conclude that the new system will be cost effective ($\alpha = .05$) ? **(Scores : 4)**

Choose the correct answer.

15. A sample of 10 specimens taken from a normal population is expected to have a mean weight of 50 gm. To test $H_0 : \mu = 50$ against $H_1 : \mu \neq 50$, we use

- (a) Z-test
- (b) Chi-square test
- (c) t-test
- (d) F-test

(Score : 1)

16. (a) Fill in the blank :

If the correlation coefficient between two variables is unity (1) there is _____ between the variables.

(Score : 1)

- (b) Using the following data calculate the correlation between X and Y :

X :	2	3	4	5	6	7	8
Y :	4	5	6	8	9	7	10

(Scores : 3)

17. An apple juice manufacturing company developed a new product and marketed in three cities with three strategies. The sales in these cities are given. The manager wants to know, is difference in sales exist between the three strategies ($\alpha = .05$).

City I :	7	8	9	10	6
City II :	10	8	7	9	5
City III :	5	7	4	9	8

(Scores : 4)

18. Fill in the blank :

In ANOVA, the test statistic using is _____.

(Score : 1)

19. Following data were obtained on study of price (X) and supply (Y) of 10 items :

$$\Sigma X = 544, \Sigma Y = 244, b_{YX} = .37$$

What will be the supply when price is 35 ?

(Scores : 3)

Fill in the blanks :

20. Correlation coefficient is the _____ of regression coefficient. (Score : 1)

21. If the value of regression coefficient is zero, the two regression line are _____. (Score : 1)

22. Discuss the association of \bar{X} -chart and R-chart. (Scores : 2)

23. A voltage stabilizer manufactures checks the quality of 50 units of their daily production for 15 days. The number of defectives are given below :

Days :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Defectives :	5	10	3	2	8	1	4	3	1	8	6	7	4	5	3

Obtain the control limit for the number of defectives and make a conclusion. (Scores : 3)

Choose the correct answer.

24. Index numbers are expressed as

- (a) Percentage
- (b) Ratios
- (c) Absolute value
- (d) All of the above

(Score : 1)

25. Calculate the Fisher's Index Number for the following data :

Commodity	Price		Quantity	
	Base Year	Current Year	Base Year	Current Year
A	8	10	10	8
B	10	13	8	6
C	11	15	15	12
D	14	12	7	5
E	12	8	5	4

(Scores : 4)

26. (a) If $Y = 20.6 + 16.8X$ is the trend line with 1995 as origin, find the trend line with 2000 as origin.

(Scores : 2)

(b) The following table gives the profit of a company from the year 2001 to 2009. Calculate the trend value by 4-year moving average method.

Year :	2001	2002	2003	2004	2005	2006	2007	2008	2009
Profit :	121	130	132	118	118	120	140	126	130

(Scores : 3)