LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. & B.Com. DEGREE EXAMINATION – **MATHS, PHYSICS & COMMERCE**

THIRD SEMESTER – NOVEMBER 2015

ST 3205 - ADVANCED STATISTICAL METHODS

Date : 12/11/2015   Dept. No.   Max. : 100 Marks

Time : 09:00-12:00

PART A

Answer ALL the questions: (10 X 2 =20)

1) Write down the formula for Yule's coefficient of association.
2) Check the consistency of the data, N = 80, (A) = 40, (B) = 50, (AB) = 45.
3) Define probability mass function.
4) Define mutually exclusive events.
5) Define level of significance.
6) Write the test statistic of test for specified proportion.
7) Fill in the blanks:

Source	d.f	S.S	M.S.S	F-ratio
Treatment	2	168.5	-	-
Error	-	-	22.83	
Total	11	374		

8) State any two situations where Poisson law can be applied.
9) Write any two uses of control chart.
10) Write down the control limits of R-chart.

PART B

Answer any FIVE of the following: (5 X 8 =40)

11) Out of 900 persons, 300 were literate and 400 had travelled beyond the limits of their district. 100 of the literates were among those who had not travelled. Is there any relation between literacy and travelling?

12) A random variable X has the following probability function.

X	0	1	2	3	4	5
P(x)	0	k	k	2k	$3k^2$	$3k^2 + k$

   Find (i) k , (ii) P(X < 4), (iii) P(X ≥ 2), (iv) P (1 ≤ X ≤ 4).

13) State any five properties of normal distribution.

14) Number of road accidents during a month follows Poisson distribution with mean 6. Find the probability that in a certain month number of accidents will be (i) not more than 3 and (ii) between 2 and 5 and (iii) atleast 2?

15) A person buys 100 electric tubes from two well known makes taken at random from stocks for testing purpose. He finds that make A has a mean life of 1300 hours with a S.D of 82 hours and make B has mean life of 1248 hours with a S.D of 93 hours. Discuss the significance of these results to test which make of electric tubes should the person buy.

16) A random sample of 10 boys has the following I.Qs : 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean IQ of 100?

17) The following table gives the yields of 15 samples of plot under three varieties of seed.

A	B	C
20	18	25
21	20	28
23	17	22
16	15	28
20	25	32

Test using analysis of variance whether there is a significant difference in the average yield of seeds.

18) The following table gives the number of defects in ten woolen carpets manufactured.

S.no.	1	2	3	4	5	6	7	8	9	10
No. of defects	3	4	5	6	3	3	5	3	6	2

Draw a c-chart and comment on it.

PART C

Answer any TWO of the following: (2 X 20 =40)

19) (a) From the data given below, calculate the coefficient of contingency between the Heights of husbands and wives.

Husband	Wives		
	Tall	Medium	Short
Tall	30	50	20
Medium	20	30	10
Short	10	20	10

(b) Let U_1, U_2, U_3 be 3 urns with two red and one black, three red and two black and one red and one black ball respectively. One of the urns is chosen at random and a ball is drawn from it. The color of the ball is found to be black. What is the probability that it has been chosen from U_2? **(12 + 8)**

20) (a) The incidence of occupational disease in an industry is such that the workmen have a 20% chance of suffering from it. What is the probability that out of six workmen,
   (i) 4 or more will contract the disease and (ii) not more than 1 will contract the disease?

(b) The life of a certain kind of electronic device has a mean of 300 hours and a standard deviation of 25 hours. Assuming that the distribution of life times which are measured to the nearest hour can be approximated closely with a normal curve, (i) find the probability that any one of these device will have a lifetime of more than 350 hours, (ii) what percentage will have life time from 220 and 260 hours? And (iii) find the probability that the devices will have lifetime between 260 and 350?

21) (a) A sample of 600 parts manufactured by a factory, the number of defective parts was found to be 45. The company however claimed that only 5% of their product is defective. Is the claim tenable?

(b) Construct a $\overline{X}$ and R chart for the following data:

X_1	22	24	24	25	21	20	25	26	27	21
X_2	33	31	28	29	28	30	31	32	33	31
X_3	33	27	26	25	32	20	27	28	29	20

Comment on it.

22) Five types of fertilizers are applied to four varieties of potatoes, each planted on five plots of land of the same size and fertility. The yield are shown in the following table:

Potatoes	Fertilizer				
	A	B	C	D	E
I	34	38	44	40	42
II	50	38	46	52	44
III	42	36	50	46	48
IV	38	44	52	36	42

Test whether (i) the effect of fertilizers and (ii) the effect of potato varieties are significant on the yield of potatoes?

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