LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.SC. & B.Com. DEGREE EXAMINATION – **PHYSICS, MATHEMATICS & COMMERCE**

THIRD SEMESTER – **APRIL 2016**

ST 3205 - ADVANCED STATISTICAL METHODS

Date: 04-05-2016   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

SECTION – 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.
4) Define Discrete random variable.
5) What are the parameters of normal distribution?
6) Define level of significance.
7) Write down the test statistic to test the equality of means in the case of large sample.
8) Fill the ANOVA table:

Source	d.f	S.S	M.S.S	F-ratio
Treatment	2	-	40	-
Error	-	270	-	
Total	11	350		

9) State any two uses of control charts.
10) Give the control limits for c - chart.

SECTION – B

Answer any FIVE questions: (5 X 8 = 40)

11) In a class test in which 135 candidates were examined for proficiency in Statistics and
Economics, it was discovered that 75 students failed in Statistics, 90 failed in economics
and 50 failed in both. Find whether there is any association between failing in Statistics
and Economics using (i) Yule's method and (ii) coefficient of colligation.

12) The probability of 3 students A, B and C solving a problem in Statistics are 1/2, 1/3 and 1/4 .
A problem is given to all the 3 students. What is the probability that (i) no one will solve the
problem,(ii) only one will solve the problem and (iii) atleast one will solve the problem?

13) The probability that a bomb hits a target is given by 0.8. Assuming a binomial distribution,
what is the probability that out of 10 bombings, (i) exactly 4 will be missed, (ii) atmost 3
will be missed and (iii) atleast 8 will be hitting the target?

14) State the properties of normal distribution.

15) Before increase in excise duty on tea, 400 people out of a sample of 500 persons were found
to be tea drinkers. After an increase in duty, 400 people were tea drinkers out of a sample of
600 people. Based on the information collected, test whether there is a significant decrease in
the consumption of tea?

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 fertilizer.

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	6	7	9	5	10	8	6	2

Draw a c-chart and comment on it.

SECTION – C

Answer any TWO questions: (2 X 20 = 40)

19) (a) From the data given below, calculate the coefficient of contingency between the height of fathers and sons.

Fathers	Sons		
	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 colour of the ball is found to be black. What is the probability that it has been chosen from third urn? **(12 + 8)**

20) (a) 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?

(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 between 220 and 260 hours? and (iii) find the probability that the devices will have lifetime between 260 and 350?

21) The yield of four strains of Grallipoli wheat planted in five blocks in kgs per plot is given below.

Strains	Blocks				
	1	2	3	4	5
A	32	34	34	35	36
B	33	33	36	37	34
C	30	35	35	32	35
D	29	22	30	28	28

Test whether there is a significant difference in the mean yield between the varieties of strains and the mean yield between the blocks.

22) (i) A company arranged an intensive training course for its team of salesmen. A random sample of 10 salesmen was selected and the value (in '000) of their sales made in the weeks immediately before and after the course are shown in the following table.

Salesman	1	2	3	4	5	6	7	8	9	10
Sales before	12	23	5	18	10	21	19	15	8	14
Sales after	18	22	15	21	13	22	17	19	12	16

Test whether there is evidence of an increase in the mean sales. (10)

(ii) From the following data calculate the central lines and control limits for the mean and range control charts: (10)

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	20	22	25	24	20	18	24	25	27	21
Range	5	6	4	3	7	2	1	5	6	3

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