Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 63141

M.B.A. DEGREE EXAMINATION, APRIL/MAY 2017.

First Semester

BA 7102 — STATISTICS FOR MANAGEMENT

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. An experiment consists of three independent tosses of a fair coin. Construct the sample space for it. Find the probability of getting two heads.

2. If X is a Poisson variate such that $E[X^2] = 6$, find $E[X]$.

3. What is standard error of mean?

4. Define unbiased estimator.

5. What is the assumption of t-test?

6. Write ANOVA table for one factor of classification.

7. List any two non-parametric tests.

8. Write the importance of Kolmogrov-Smirnov test.

9. Give some examples of Time series.

10. What are regression coefficients?

PART B — ($5 \times 13 = 65$ marks)

11. (a) (i) In 1984, there will be three candidates for the position of principal – Mr. Chatterji, Mr. Ayangar and Dr. Singh – whose chances of getting the appointment are in the proportion 4 : 2 : 3 respectively. The probability that Mr. Chatterji if selected will introduce co-education in the college is 0.3. The probability of Mr. Ayangar and Dr. Singh doing the same are respectively 0.5 and 0.8. What is the probability that there will be co-education in the college in 1984? $(6\frac{1}{2})$

(ii) A machine manufacturing screws is known to produce 5% defective. In a random sample of 15 screws what is the probability that there are (1) exactly 3 defectives (2) not more than 3 defectives? $(6\frac{1}{2})$

Or

(b) (i) A random variable X has the following probability distribution

x :	-2	-1	0	1	2	3
$p(x)$:	0.1	k	0.2	$2k$	0.3	$3k$

(1) Find k.

(2) Evaluate $P[X < 2]$ and $P[-2 < X < 2]$.

(3) Find the cdf of X and

(4) Evaluate mean of X. $(6\frac{1}{2})$

(ii) The mean yield for one-acre plot is 662 kilos with a s.d. 32 kilos. Assuming normal distribution, how many one-acre plots in a batch of 1000 plots would you expect to have yield (1) over 700 kilos (2) below 650 kilos (3) what is the lowest yield of the best 100 plots? $(6\frac{1}{2})$

12. (a) (i) If $x_1, x_2, \ldots, x_n$ are random observations on a Bernoulli variable X, taking the value 1 with probability θ and the value 0 with probability $1-\theta$. Show that $T(T-1)/[n(n-1)]$ is an unbiased estimate of θ^2, where $T = \sum_{i=1}^{n} x_i$. $(6\frac{1}{2})$

(ii) A coin is tossed 10 times. What is the probability of getting 3, 4 or 5 heads? Use Central limit theorem. $(6\frac{1}{2})$

Or

(b) (i) Scientist need to be able to detect small amounts of contaminants in the environment. As a check on the current capabilities, the following measurements were made on test specimen spiked with a known concentration 1.25 μg/l of lead. That is, the readings should average 1.25 if there is no background lead in the samples.

2.4 2.9 2.7 2.6 2.9 2.0 2.8 2.2 2.4 2.4 2.0 2.5

Compute the point estimator $\overline{X}$ and estimated stand error of $\overline{X}$. $(6\frac{1}{2})$

(ii) Show that for the distribution $dP = \theta e^{-x\theta}\, dx$, $0 \le x < \infty$ central confidence limits for large sample with $\alpha = 0.95$ are given by $\theta = \dfrac{1 \pm \frac{1.96}{\sqrt{n}}}{\bar{x}}$. $(6\frac{1}{2})$

13. (a) Two random samples give the following results.

Sample	Size	Sample Mean	$\Sigma(x-\overline{x})^2$
1	12	14	108
2	10	15	90

Test whether the samples come from the same population.

Or

(b) (i) A random sample of 500 oranges was obtained from a large consignment and 60 were bad. Get the 98% confidence limits for the percentage number of bad oranges. ($Z_\alpha = 2.33$) $(6\frac{1}{2})$

(ii) The following data are got from an investigation.

	No. of items	Mean	S.D.
Group 1	50	181.5	3.0
Group 2	75	179.0	3.6

Find out whether the two means differ significantly. $(6\frac{1}{2})$

14. (a) (i) Two samples are as follows :

Values of X_i : 1, 2, 3, 5, 7, 9, 11, 18

Values of Y_i : 4, 6, 8, 10, 12, 13, 14, 15, 19.

Test whether the two samples come from the same population at level $\alpha = 0.10$ by using the Mann-Whitney U test. $(6\frac{1}{2})$

(ii) An experiment designed to compare three preventive methods against corrosion yielded the following maximum depths of pits (in thousands of an inch) in pieces of wire subjected to the respective treatments.

Method A :	77	54	67	74	71	66	
Method B :	60	41	59	65	62	64	52
Method C :	49	52	69	47	56		

Use the 0.05 level of significance to test the three samples come from identical population using Kruskal-Wallis test. $(6\frac{1}{2})$

Or

(b) An automobile company gives the following information about age groups and the liking for particular model of car which it plans to introduce. On the basis of this data can it be concluded that the model appeal is independent of the age group. ($\chi^2_{0.05}(3) = 7.815$) (13)

Persons who :	Below 20	20–39	40–59	60 and above
Liked the car	140	80	40	20
Dislike the car :	60	50	30	80

15. (a) Following table gives age (X) in years of cars and annual maintenance cost (Y).

X	1	3	5	7	9
Y	15	18	21	23	22

Find the regression lines X on Y and Y on X. Also estimate the maintenance cost for 4 years old car. (13)

Or

(b) Calculate the seasonal indices from the following data using the average method. (13)

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1974	72	68	80	70
1975	76	70	82	74
1976	74	66	84	80
1977	76	74	84	78
1978	78	74	86	82

PART C — (1 × 15 = 15 marks)

16. (a) Analyse and list the limitations of statistics. Classify the data and state the precautions for preparing questionnaire. (15)

Or

(b) Four doctors each test four treatments for a certain disease and observe the number of days each patient takes to recover. The recovery time in days are given as follows :

	Treatment			
Doctor	1	2	3	4
A	10	14	19	20
B	11	51	17	21
C	9	12	16	19
D	8	13	17	20

Analyse the difference between (i) the doctors and (ii) the treatment. (15)