Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MBA/SEM-2(FT & PT)/MB-203/2012

2012

QUANTITATIVE METHODS – II

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

i) If mean and variance of a binomial distribution are 5 and 4 respectively, the value of n is

a) 15 b) 10

c) 20 d) 25.

ii) If the population proportion is 0·5 and standard error of sample proportion is 0·01, then the sample size is

a) 250 b) 2500

c) 3500 d) 3000.

iii) The probability of type-II error is

a) α b) $1-\beta$

c) $1-\alpha$ d) β.

iv) The normal curve is perfectly symmetrical about

a) mean b) median

c) mode d) none of these.

v) For test of hypothesis $H_0 : \mu_1 = \mu_2$ against $H_1 : \mu_1 < \mu_2$, the critical region at $\alpha = 0 \cdot 05$ and $n > 30$ is

a) $z \leq 1 \cdot 96$ b) $z > 1 \cdot 96$

c) $z \leq 1 \cdot 645$ d) $z > 1 \cdot 645$.

vi) The value of Spearman's rank correlation coefficient

a) lies between 0 & 1 b) lies between –3 & 3

c) lies between –1 & 1 d) none of these.

vii) The set of values of the test statistic which lead to rejection of the null hypothesis is called

a) critical region

b) size of the critical region

c) level of significance

d) none of these.

viii) The mean of the chi-square distribution with n degrees of freedom is

a) $2n$ b) n^2

c) $\sqrt{n}$ d) n.

ix) The distribution whose mean is equal to variance is

a) binomial b) Poisson

c) normal d) F distribution.

x) In the Kruskal-Wallis test having k samples, the appropriate number of degrees of freedom is

a) $k - 1$ b) k

c) $n - k$ d) $n - k - 1$.

xi) Mann-Whitney U test is used for testing

a) equality of two means

b) equality of three means

c) equality of more than two means

d) none of these.

xii) If the population size is 100, sample size is 4 and S.D. is 16, then the standard error of the sample mean in SRSWR is

a) 8 b) 2

c) 0 d) 1.

xiii) The maximum likelihood estimator of the parameter of a Poisson distribution is

a) sample mean b) population mean

c) standard error d) none of these.

xiv) Randomness of a series of observations is tested by

a) Run test

b) Signed rank test

c) Kolmogorov-Smirnov test

d) Mann-Whitney test.

xv) For calculating the popularity of the television serials, TRP ratings are calculated by using

a) census survey

b) simple random sampling

c) cluster sampling

d) judgment sampling.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Define Point and Interval estimation. Write down the criteria of a good estimator. 1 + 1 + 3

3. A sample of 1000 observations has a mean 4·3 cm and standard deviation 2·7 cm. Find 95% confidence limits for the population mean.

4. The Wall Street Journal recently ran an article indicating differences in perception of sexual harassment on the job between men and women. The article claimed that women perceived the problem to be much more relevant than did

men. One question asked to both men and women was : "Do you think sexual harassment is a major problem in the American workplace ?" Some 24% of the men compared to 62% of the women responded, "Yes." Suppose that 150 women and 200 men were interviewed. What is the value of the test statistic ?

5. Write short notes on Cluster Analysis and Discriminant Analysis.
6. Differentiate Type-I error from Type-II error.
7. Distinguish between simple random sampling and stratified random sampling.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) A sample analysis of a examination results of 200 MBAs was made. It was found that 46 students had failed, 68 secured third division, 62 secured second division and the rest were placed in first division. Are these figures commensurate with the general examination result that is in the ratio of 2 : 3 : 3 : 2 for various categories respectively ? Given $\chi^2 = 7 \cdot 815$ with $3 d.f$ at 0·05 level.

   b) An Insurance agent has claimed that the average age of policyholders who insure through him is less than the average for all agents, which is 30·5 years. A random sample of 100 policyholders who had insured through him gave the following age distribution :

Age (years)	16-20	21-25	26-30	31-35	36-40	Total
No. of persons	12	22	20	30	16	100

Test his claim at 5% level. 8 + 7

9. a) The following shows the retail prices (Rs. per kg.) of a certain commodity in some shops selected at random in three different palaces :

Places

A	*B*	*C*
6	9	5
7	10	6
5	11	4

Carry out the analysis of variance to test the significance of the difference between prices of the commodity in three places [Given $F_{0\cdot05}(2, 6) = 5\cdot14$]. Also set up the ANOVA table.

b) Sales of a company rose from Rs. 39,45,000 to Rs. 46,21,000 from second quarter to third quarter. The seasonal indices for these quarters are 103 and 150 respectively. The owner of the company holds that it is a losing concern. Analyse the above information for supporting the owner's view. 9 + 6

10. a) Samples have been taken from two branches of a chain of stores. The samples relate to the daily turnover of both the branches. Is there any difference in turnover between the two branches ?

Branch 1 : 23500 25500 35500 19500 24400 24000 23600 25900 26000

Branch 2 : 24000 19800 22000 21500 24500.

b) Pre and post-test scores after a particular training programme are known to be non-normal in their distribution. A sample of the scores, with the calculated changes, is given below :

Pre-test	67	71	83	69	68	36	52	72	56
	64	76	83	69	68	36	52	72	56
Post-test	58	62	84	67	72	38	63	72	55
	59	76	84	69	72	38	63	74	66

Conduct a sign test for determining whether any significant change has taken place or not ? 7 + 8

11. a) Calculate five yearly moving averages of the following data :

Year :	1	2	3	4	5	6	7	8	9	10
Sales : (Rs. in '000)	5	9	12	8	13	2	4	7	11	15

b) Fit a straight line trend to the following data :

Year :	1965	1966	1967	1968	1969	1970	1971
Gross ex-factory value (Rs. crores)	672	824	967	1204	1464	1758	2057

and estimate the Gross ex-factory value (Rs. crores) for the year 1975. 7 + 8

12. a) Suppose that three groups of salesman (being employees of a company) underwent training. The method of training used was different for each group. When training was completed, the salesman were given a test. The marks scored by them are shown below.

Training method *A*	75	83	68	85	90	61	—
Training method *B*	62	70	67	82	80	87	64
Training method *C*	65	71	74	63	89	—	—

Use Kruskal-Wallis Test to find out whether there was difference in the effectiveness of the three training methods. [Given $\chi^2_{0\cdot05}(2) = 5\cdot991$] 8

b) What is Log - Normal distribution ? Subway trains on a certain line run every half hour between midnight and six in the morning. What is the probability that a man entering the station at a random time during this period will have to wait at least 20 minutes ? 3 + 4

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