

**MASTER OF COMMERCE
SECOND SEMESTER
BUSINESS STATISTICS AND OPERATIONS RESEARCH
MCM-201**

Duration : 3 hrs.

Full Marks: 70

[PART-A: Objective]

Time : 20 min.

Marks : 20

Choose the correct answer from the following:

1X20=20

1. We get an upward sloping line from left to right when correlation is
 - a. Positive
 - b. Negative
 - c. Zero
 - d. Indeterminate
2. Find the value of r^2 if $b_{yx}=1.6083$ and $b_{xy}=0.5578$
 - a. 0.543
 - b. 0.8971
 - c. 0.641
 - d. 0.542
3. The error of accepting Null Hypothesis when it is true is known as
 - a. Type II error
 - b. Sampling error
 - c. Type I error
 - d. Non-sampling error
4. Which of the following is a problem in the construction of index number?
 - a. Purpose of index number
 - b. Selection of commodities
 - c. Selection of base period
 - d. All of the above
5. The cause and effect relationship between two variables can be estimated from
 - a. Correlation
 - b. Regression
 - c. Both
 - d. None of the above
6. Which of the following is inherent in every time series?
 - a. Secular trend
 - b. Seasonal variation
 - c. Cyclical variation
 - d. Random variation
7. The data which is available from already collected sources is called
 - a. Raw data
 - b. Primary data
 - c. Secondary data
 - d. None of the above
8. Enumeration of each and every unit of the population is done in
 - a. Census method
 - b. Sample method
 - c. Non-sampling method
 - d. Convenient method
9. In order to be a better representative of the population, the sample size must be
 - a. Small
 - b. Large
 - c. Zero
 - d. None of the above

10. If the calculated value of a test statistic is larger than the tabular value, the null hypothesis should be
- Accepted
 - Rejected
 - Indeterminate
 - Both (b) and (d)
11. If n =sample size and k =number of explanatory variables, then $n-k$ represents
- Level of significance
 - Degrees of freedom
 - Critical region
 - None of the above
12. Which of the following is a method of collecting primary data?
- Direct personal investigation
 - Mailed questionnaire
 - Indirect oral interview
 - All of the above
13. The graphical method of LP problem uses
- Objective function equation
 - Constraint equations
 - Linear equations
 - All of the above
14. Managerial decisions are based on
- An evaluation of quantitative data
 - The use of qualitative factors
 - Results generated by formal models
 - All of the above.
15. An optimization model
- Provides the best decision.
 - Provides decision within its limited context.
 - Helps in evaluating various alternatives.
 - All of the above.
16. Network models have advantage in terms of project
- Planning
 - Scheduling
 - Controlling
 - All of the above
17. The activity that can be delayed without affecting the execution of the immediate succeeding activity is determined by
- Total float
 - Free float
 - Independent float
 - None of the above
18. The quantitative approach to decision analysis is a-
- Logical approach.
 - Rational approach
 - Scientific approach.
 - All of the above.
19. The mathematical model of an LP problem is important because
- It helps in converting the verbal description and numerical data into mathematical expression
 - Decision-makers prefer to work with formal models
 - It captures the relevant relationship among decision factors
 - It enables the use of algebraic technique

20. Which of the following is an assumption of an LP model
- a. Divisibility
 - b. Proportionality
 - c. Additivity
 - d. All of the above

(PART-B : Descriptive)

Time: 2 HRS 40 MINS

Marks : 50

[Answer question no.(1) & any four (4) from the rest]

1. Distinguish between census and sample methods of collecting data. 6+4=10
Distinguish between sampling and non-sampling errors.

2. From the data given below find: 5+5=10
 - i) The two regression coefficients.
 - ii) The two regression equations.

| | | | | | | | | | | |
|---------------------|----|----|----|----|----|----|----|----|----|----|
| Marks in Economics | 25 | 28 | 35 | 32 | 31 | 36 | 29 | 38 | 34 | 32 |
| Marks in Statistics | 43 | 46 | 49 | 41 | 36 | 32 | 31 | 30 | 33 | 39 |

3. a. In a certain sample of 2000 families, 1400 families consume tea. Out of 1800 Hindu families, 1236 families consume tea. Use Chi square test and state whether there is any significant difference between consumption of tea among Hindu and non-Hindu families. (Tabulated Chi-square for 1 d.f=3.841) 7+3=10

b. Differentiate between positive and negative correlation.

4. a. Calculate Karl Pearson's correlation coefficient for the given data. 8+2=10

| | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|
| X | 39 | 65 | 62 | 90 | 82 | 75 | 25 | 98 | 36 | 78 |
| Y | 47 | 53 | 58 | 86 | 62 | 68 | 60 | 91 | 51 | 84 |

- b. Discuss the basis of probability sampling.

5. a. What are the uses of index numbers? 5+5=10
b. Discuss the problems in the construction of index.

6. A small project is composed of activities whose time estimates are listed in the table- 5+5=10

| Activity (i-j) | Optimistic time(o) | Most likely time(m) | Pessimistic time(p) |
|----------------|--------------------|---------------------|---------------------|
| 1-2 | 1 | 1 | 7 |
| 1-3 | 1 | 4 | 7 |
| 1-4 | 2 | 2 | 8 |
| 2-5 | 1 | 1 | 1 |
| 3-5 | 2 | 5 | 14 |
| 4-6 | 2 | 5 | 8 |
| 5-6 | 3 | 6 | 15 |

- a) Draw the project network.
b) Find the expected duration and variance of each activity.

7. What do you mean by CPM and PERT method? Explain three models of Operation Research. Describe the first five steps of methodology of Operations Research 2+3+5=10

8. Consider the details of a project as shown in the table-: 6+4=10

| Activity | Preceding activities | Activity duration(months) |
|----------|----------------------|---------------------------|
| A | - | 2 |
| B | - | 5 |
| C | - | 4 |
| D | B | 5 |
| E | A | 7 |
| F | A | 3 |
| G | B | 3 |
| H | C,D | 6 |
| I | C,D | 2 |
| J | E | 5 |
| K | F,G,H | 4 |
| L | F,G,H | 3 |
| M | I | 12 |
| N | J,K | 8 |

- (i) Draw the CPM network diagram and find the critical path and also the project completion time.
(ii) Calculate total floats and free floats for each of the activities.

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