3. a. "Probability sampling has several advantages over judgement   4+6=10
sampling"- Discuss.
   b. A population consists of 5 units and they are 2, 4, 6, 8, 10, 1.
Draw all possible simple randomsample of size 3 without
replacement. Also find their sample means.

4. a. Given that $r_{xy} = 0.5$, Cov (x, y) = 6.2 , Var(y) = 4 , find the   2+8=10
standard deviation of x.
   b. State three properties of correlation coefficient
   c. Find the correlation coefficient between x and y from the
following data and interpret the result.
   X: 70   66   62   58   54   50

   X: 63   49   56   35   42   28

5. A dealer wishes to purchase a number of fans and sewing machines. He   4+6-=10
has only Rs. 5760 to invest and has space for almost 20 items. A fan costs
him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can
sell a fan at a profit of Rs. 22 and a sewing machine at a profit of Rs. 18.
Assuming that he can sell all the items that he can buy, how should he
invest his money in order to maximise his profit. Formulate it as a LPP
and then solve the LPP by any method.

6. a. Explain the term linearity and certainty in relation to LP   3+7=10
problem.

   b. Solve the following LPP by simplex method or graphical
method
   Max $Z= 100X_1 + 40 X_2$
   Sub to $4X_1 + 5X_2 \leq 90$
            $9X_1+ 4X_2 \leq 180$
            $X_1 , X_2 \geq 0$

7. a. How does a network analysis helps in large complex projects.   5+5=10
   b. Explain the following terms in context of network analysis
   i. Earliest starting time
   ii. Latest finishing time

8. a. Draw the network diagram and   3+2+5
   i. Find the critical path and duration of the project   =10
completion time.
   ii. Calculate total float and Independent foat

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[4]

MASTER of COMMERCE
SECOND SEMESTER
BUSINESS STATISTICS & OPERATIONS RESEARCH
MCM - 201
(Use Separate Answer Scripts for Objective & Descriptive)

Duration : 3 hrs.   Full Marks : 70

[**PART-A : Objective**]

Time : 20 min.   Marks : 20

Choose the correct answer from the following: *1×20=20*

1. _____ is a techniques which enables us to draw inferences about the entire population
simply by studying a few of them
   a. Census   b. Sampling
   c. branching   d. None of these

2. Publications of Universities and Research institutes are the sources of _____ data.
   a. Primary   b. Secondary   c. census   d. None of these

3. For a qualitative phenomenon _____ is a suitable average
   a. Mean   b. Median
   c. Mode   d. None of these

4. Cost of living index numbers are also known as _____ index numbers.
   a. Wholesale price   b. Retail price
   c. Consumer price   d. None of these

5. The coefficient of correlation is independent of
   a. change of scale only   b. change of origin only
   c. both change of scale and origin   d. neither change of origin nor change of
                                        scale

6. The lines of the regression are _____ if r = 0.
   a. coincide   b. perpendicula
   c. parallel   d. None of these.

7. If b_{yx} and b_{xy} are two regression coefficients then $r_{xy} = $ _____.
   a. $b_{yx}+ b_{xy}$ b. $\sqrt{b_{yx} \, b_{xy}}$
   c. $b_{yx} \times b_{xy}$ d. All of these

8. _____ index number satisfies both time reversal test and factor reversal test
   a. Laspeyre's   b. Paasche's
   c. Fisher's   d. None of these

9. ____is the general long term movement in the time series value of the variable over a
fairly long period.
   a. Seasonal variation   b. Secular trend
   c. Cyclical variation   d. All of the above

[1]   P.T.O.

10. Operations Research is a _____ approach to problem solving for executives.
   a. multi- disciplinary
   b. Scientific
   c. Intuitive
   d. all of the above

11. For analyzing a problem, decision- makers should normally study
   a. its qualitative aspects
   b. its quantitative
   c. both (a) and (b)
   d. neither (a) nor (b)

12. Managerials decisions are based on
   a. an evaluation of quantitative data
   b. the use of quantitative
   c. numbers produced by formal model
   d. all of the above

13. A constraints in an LP model restricts
   a. value of objective function
   b. value of decision variable
   c. use of the available resource
   d. all of the above

14. Constraints in an LP model represents
   a. Limitations
   b. Requirements
   c. balancing limitations and requirements
   d. all of the above

15. The graphical method of LP problem uses
   a. objective function equation
   b. constraint equations
   c. linear equations
   d. all of the above

16. For maximization LP model, the simplex is terminated when all values
   a. $c_j - z_j \leq 0$
   b. $c_j - z_j \geq 0$
   c. $c_j - z_j = 0$
   d. $z_j \leq 0$

17. Leaving variable is selected with key row having positive _____ ratio in simplex method.
   a. Maximum
   b. Minimum
   c. both a) and b)
   d. None of these

18. For a maximization problem the objective function coefficient for a slack variable in simplex method is
   a. + 1
   b. – 1
   c. 0
   d. None of the above

19. PERT is a network technique which is known as
   a. Performance Evaluation and Review Technique
   b. Programme Evaluation and Review Technique
   c. Project Evaluation and Review Technique
   d. None of these

20. Critical Path Method is a _____ model
   a. Linear Programming
   b. Transportation
   c. Deterministic
   d. All of the above

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Contd...

[PART-B : Descriptive]

Time : 2 hrs. 40 min.   Marks : 50

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

1. a. What are the components of time series? Discuss them with examples.   3+2+5 =10

    b. From the data given below calculate 3 yearly weighted moving averages, the weights being 1,2,2.

Year	2000	2001	2002	2003	2004	2005	2006		2004	2005	2006
Production in tons	7	5	3	4	5	6	3		5	6	3
Year	2000	2001	2002	2003	2004	2005	2006		2004	2005	2006
Production in tons	7	5	3	4	5	6	3		5	6	3

2. a. Why index number is called economic barometer ?   2+1+7 =10

    b. Why Fishers index number is said to be ideal index number. Calculate Fisher's ideal Index number from the following data and show that it satisfies both the Time Reversal Test and Factor Reversal Test.

Commodities	2010		2017		2009	
	Price	Value	Price	Value	Price	Value
A	10	100	12	96	12	96
B	8	96	8	104	8	104
C	12	144	15	120	15	120
D	20	300	25	250	25	250
E	5	40	8	64	8	64
F	2	20	4	24	4	24