

Note :

- 1) All questions are compulsory.
- 2) Only simple calculators are allowed.
- 2) Figures to the right indicate full marks.

Q.1. a) Define : (i) Population & Sample. (4)  
(ii) Null hypothesis.

b) From 1990 to 1995, the mean price/earning (P/E) Ratio of the approximately 1800 stocks listed on the national stock exchange was 14.35 and the standard deviation was 9.73. In a sample of 30 randomly chosen NSE stocks, the mean P/E ratio in 1996 was 11.77. Does the sample present sufficient evidence to conclude (at 5% level of significance) that in 1996 the mean P/E ratio for NSE stock has changed from its earlier value? (5)

c) The following figures show the distribution of digits in numbers chosen at random from a telephone directory.

digit	0	1	2	3	4	5	6	7	8	9
frequency	853	1107	1026	997	966	1075	933	1107	972	964

Test of 5% level of significance, whether the digits may be taken to occur equally frequently in the directory? (6)

(Given :  $X^2$  tabulated value at 5% with 9 d.f. = 16.919  
|Z| at 5% for a two tailed test = 1.96)

**OR**

Q. 1. a) Define : (i) Type I & Type II errors. (8)  
(ii) Simple interest & compound interest.  
(iii) Unbounded solution in graphical method.  
(iv) Critical region.

b) A person requires 15, 10 and 12 units of chemicals A, B and C respectively for his production plant. A liquid product contains 6, 4 and 2 units of A, B and C respectively per bottle. A dry product contains 1, 5 and 10 units of A, B and C per box. If the liquid product is for Rs. 3 per bottle and dry product is for Rs. 2 per box, how many of each should be purchased in order to minimise the cost?

1) Formulate this problem as an LPP model. (5)

2) What are the methods to solve an LPP?

Which method can be applied to the above problem? (2)

**P.T.O.**

Q.2. a) Solve the following LPP graphically. (6)

$$\text{minimise } Z = 3000X_1 + 5000X_2$$

Subject to

$$20x_1 + 40z_2 \geq 1000$$

$$25x_1 + 20x_2 \geq 800$$

$$x_1, x_2 \geq 0$$

b) Explain the rules of construction of a Project Network. (3)

c) A company sent the following information about the of computer installation system.

Activity	Predecessor	Time (days)
A	-	2
B	A	3
C	A	4
D	B, C	6
E	D	2
F	E	8

(i) Find Draw the network diagram. (2)

(ii) Find the earliest start time for all activities. (2)

(iii) Find the critical path. (2)

**OR**

Q.2. a) The standard weight of a special purpose brick is 5 kg and it contains two ingredients  $B_1$  and  $B_2$ ,  $B_1$  cost Rs. 5 per kg and  $B_2$  costs Rs. 8 per kg. Strength considerations dictate, that the brick contains not more than 4 kg of  $B_1$  and minimum of 2 kg of  $B_2$  since the demand for the product is likely to be related to the price of the brick. Formulate the above problem as an LPP model. (4)

b) For following activities and its 3 time estimates.

1) Draw project network diagram. (3)

2) Find expected durations and variance of each activity. Also find critical path. (4)

**P.T.O.**

Activity	Estimated durations (weeks)		
	Optimistic	most likely	Pessimistic
1-2	2	2	14
1-3	2	8	14
1-4	4	4	16
2-5	2	2	2
3-5	4	10	28
4-6	4	10	16
5-6	6	12	30
6-7	2	4	6

c) Explain the three time estimates of the activities. (4)

Q.3. a) Based on the following information state whether the investment is worthwhile if the amount of cash outflows presently is Rs. 16000, using NPV.

Year	1	2	3	4	5
Cash Inflow	5000	4000	5000	7000	2000

Discount Rate is 10% (5)

b) How many years will it take for money to double when interest is compounded annually at 7%. (5)

c) Write a short note on 1) Annuity 2) EMI (5)

**OR**

Q.3 a) Solve the following LPP by graphical Method.

$$\text{Maximize } Z = 8x_1 + 16x_2$$

Subject to constraints

$$x_1 + x_2 \leq 200$$

$$x_2 \leq 125$$

$$3x_1 + 6x_2 \leq 900$$

$$x_1 + x_2 \geq 0$$

Also define the type of solution. (7)

b) A small assembly plant assembles a machine with following activities. The time duration for which is given below.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-8
durations (hrs.)	2	2	1	4	8	5	3	1	5

1) Draw Project Network

2) Find earliest and latest times & critical path.

(8)  
P.T.O.

Q. 4. a) Calculate the expected rate of return and variance of the rate of return for the following

Rate of Return	30	35	40	25	20	
Probability	0.1	0.2	0.3	0.1	0.3	(5)

b) 1000 student of a college were graded according to their IQ and the economic conditions of their homes. Use test to find out whether there is any association between economic condition at home and IQ.

Economic Condition		I	Q	
	High		Low	Total
Rich	460		140	600
Poor	240		160	400
Total	700		300	

(Given tabulated  $\chi^2$  at 5% and 1 d.f. - 3.84) (6)

- c) Fill in the blanks. (4)
- i) \_\_\_\_\_ can be classified as diversifiable & non diversifiable.
  - ii) \_\_\_\_\_ is a combination of different kinds of financial assets.
  - iii) Future value = \_\_\_\_\_
  - iv) \_\_\_\_\_ is a hypothesis of no difference.

**OR**

Q. 4. a) Find  $\beta$  for the following security. (6)

Year	Return on security (Ri%)	Return of Market portfolio (Rm %)
1	12	15
2	18	20
3	20	22
4	10	16
5	12	15
6	16	20

b) Solve the following LPP using graphical Method : (5)

Maximise  $Z = 30 X_1 + 40 X_2$

Subject to

$$3x_1 + x_2 \leq 9$$

$$x_1 + 2x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

c) Define different types of solutions of an LPP, which method will you use for an LPP with more than two variables. (4)