F4 (B/I) Quantitative Methods - II

ANVIL

TIME : 2 hrs. **MARK : 60**

Instruction : 1) Figures to the right indicate full marks.
2) Simple Calculators are allowed.
3) All questions are compulsory.

Q.1 a) For the following data, calculate the price index number for 1980 with 1979 as the base year, using (a) Paasche's Method (b) Laspeyre's Method. (c) Dorbish. Bawley's Method (d) Fisher's Method 06

Commodity	1979		1980	
	Price	Quantity	Price	Quantity
A	20	8	40	6
B	50	10	60	5
C	40	15	50	10
D	20	20	20	15

b) A Company produces two products A & B. Both products are processed on three machines M, N & P. The time required in hours to produce one unit of each product on each of the machines is given along with the total available time for each machine in the following table. 06

Machine	Time required / Units of		Total Availabe
	A	B	Time
M	3	3	36
N	4	2	40
P	2	6	60

Profits are Rs.75 per unit of A & Rs.200 per unit of B. Formuate & Solve graphically the L.P.P. to to maximize profit.

c) A money lender offers an installment scheme. Under the scheme a person can take a loan in 4 equal installments. Commencing at the end of every 6 months. If he charges interest at the rate of 16% p.a. What is the value of each installment paid half yearly.? 03

OR

Q.1 a) A manufacture has to decide on the quantities of products P & Q. Atleast 50 units of P must be produced per week. The market cannot absorb more than 60 units of Q per week. The machine time required is 4 hours per units of P and 5 hours per unit of Q. In all, 500 hours of the machines are available per week as there are 10 machines working each for 50 hours per week. Formulte & solve graphically the L.P.P. to maximize the profit, if the profit per unit is Rs.100 for P & Rs.120 for Q. 06

b) (i) Explain the terms Null Hypothesis & Alternate Hypothesis. 03

(ii) The mean life of a sample of 101 electric bulbs produced by a company is found to be 1570 hours with a S.D. of 120 Hrs. If μ is the mean life time of all the bulbs produced by the company, test the hypothesis. $\mu = 1600$ Hrs. against the Altanative Hypothesis $\mu \neq 1600$ Hrs., using a 5% level of significance 03

c) A random sample of 400 apples was taken from a large consignment & 52 were found defective. Estimate the standard error of thesample proportion of defective apples. Also find a point estimate for the population proportion. of defective apples. 03

Q.2 From the following data, estimate y, $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ when $x = 3$ 06

x	0	2	4	6

ii) If $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 2 & 0 \\ -2 & 7 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 6 & -2 & 7 \\ 8 & 0 & 9 \\ 3 & 1 & -5 \end{bmatrix}$ 02

Find the matrix X such that $2A - 3B + 5x = 0$

c) The demand cruve & supply curve for a commodity are. $P = 20 - 4x$, $P = 8 + 4x$ respectively. Find the consumer surplus and producer surplus at the equilibrium price. 04

OR

A.2 a) Define : Prdoucer surplus & consumer surplus. Hence find consumer's surplus for (1) $x_0 = 4$ 04

(2) $P_0 = 6$ when the demand curve for a commodity is given by $P = 10 - 2x$.

b) Find an estimate for $\int_0^6 \frac{1}{2x+3}\,dx$ using a) Trapezoidal rule b) Simposon's $^1/_3$ rd rule 06

c) Simpson's $^3/_8$ rule, using 7 co-ordinates.

c) The total cost function is $C = x^3 - 100x^2 + 15x$, where x is the number of units produced. Find x for which the average cost is (a) decreating (b) minimum. 05

Q.3 a) What are the steps involved in the construction of index numbers? 06

b) (i) Amount of Rs.9000 is invested today. Find the compound interest after 2 years if interest at rate 12% p.a. is compounded quarterly. 03

(ii) Find the future value of an ordinary annuity of Rs.2750 paid at the end of each of 6 months for 2 years at 12% per year compounded half yearly. How much interest will be earned on the annuity period. 03

c) Evaluate the following integrals : 03

i) $\int \frac{5x^2 - 2x + 11}{\sqrt{x}}\,dx$

ii) $\int_3^4 \left(\frac{1}{4} - \frac{x}{2}\right) dx$

OR

Q.3 a) Evaluate the following : 03

i) $\int \frac{x^4 - 3x^2 + x - 15}{x}\,dx$

ii) $\int_2^6 \frac{1}{4x-1}\,dx$

b) What is an index number? State the uses of index numbers. 06

c) (i) What are the type I & type II errors? Explain briefly. 04

(ii) A coin is tossed 400 times & it turns head 216 times. Is it reasonable to assume that the coin is unbiased? 02

Q.4 a) (i) Explain Economic Order Quantity. (EOQ) 02

(ii) The annual usage of a raw material is 40,000 units for the ABC Ltd. The price of raw material is Rs.50 per unit. The ordering cost is Rs.200 per order & the carrying cost is 20 percent of the average value of the inventary. The supplier has recently introduced a 4 percent discount on the price of material of orders of 1500 units & above. Determine the optimal order quantity. 04

c) Calculate the expected rate of return from the following information relating to B Ltd.

State of Economy	Probability of Occurence	Rate of Return.
Boom	0.30	40%
Normal	0.50	30%
Recession	0.20	20%

OR

a) Calculate beta β in case of share of Nelco Ltd., whose returns & market partfolio returns are give below.

Year	Nelco Ltd.	Market Partfolio returns.
1	20	14
2	24	18
3	10	9
4	15	14
5	(-) 10	(-) 8
6	12	10
7	18	16
8	28	30
9	33	35
10	40	42

b) The data relating to the preferences of investor's & their income is given below.

Types of Securities	No. of investors upto Rs.5000	having income above Rs.5000	Total
a) Risk less	17	24	41
b) Risky	13	46	59
	30	70	100

Test the hypothesis that the middle class investore prefer to invest invarious financial instruments for their future investments irrerspective of their level of income

(Table value $X^2 = 3.841$)

c) The probability distribution of annual returnns on a security are given below :

Returns on security	-0.35	-0.25	-0.15	-0.05	0.05	0.15	0.25	0.35
Probability	0.04	0.08	0.14	0.17	0.26	0.18	0.09	0.04

Calculate the expected return on the security.

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