F.Y.P.G.D.O.R.M.

July 2017

Con. 219-17. Business Mathematics BC-5175

(Paper-I)

(3 Hours) [Total Marks : 100

N.B. : (1) Attempt any **five** questions.
(2) **Figures** to **right** indicate **marks** to a sub-question.
(3) **Graph** paper will be supplied on request.
(4) Use of scientific, held non-programmable **calculator** is **allowed.**

1. (a) Sanjay InfoTech manufactured 3800 units of micro chips in 3rd year of its launching and 8000 units in the 6th year. Assuming the increase in production is constant, find the (i) number of units manufactured in the 1st year, (ii) the total production in 6 years. **10**

   (b) An investigator interview 100 interviewers to determine their skill, expert in C language, expert in Oracle, expert in V.B. Report occurred 10 are skilled in all three, 20 are skilled in C and V.B., 30 are skilled in V.B. and Oracle, 25 are skilled in C and Oracle, 12 are skilled in C only, 5 are skilled in V.B. only and 8 are skilled in Oracle only. Then (i) How many are skilled in at least one ? (ii) How many are skilled in C but not V.B.? (iii) How many are skilled in V.B. and Oracle but not C ? **10**

2. (a) Two factories A and B produce similar articles at the same cost. The distance between their locations is 30km. The distribution expenses incurred by them per article per km. are in the ratio 2:1. Find the region in which A will be able to sell its articles cheaper than B, if the profit charged by them per article is equal. **10**

   (b) If $x = \frac{1}{3+2\sqrt{2}}$ than prove that $x^4 - 6x^3 + x^2 + 3 = 2\sqrt{2}$. **10**

3. (a) Find the sum of n terms of $1 + 2x + 3x^2 + 4x^3 + ...$ **10**

   (b) Prove that $A = \begin{vmatrix} (a+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{vmatrix} = 2\,abc \times (a+b-c)^2$. **10**

4. (a) The total cost function for a commodity is given by $C = 3x^3 - 15x^2 + 25x - 12$. Find the value of the output x for which the average cost is minimum. **10**

   (b) The demand and supply functions for a commodity are —— **10**

   $p = 10 - \frac{5}{2}x$ and $p = \frac{1}{2}x^2 + 8$ respectively. Plot the graph, find the equilibrium price and calculate customers and producers surplus at the equilibrium price. Represent them on the graph.

[TURN OVER

5. (a) Determine rank of matrix $A = \begin{bmatrix} 1 & 3 & 5 \\ 3 & 3 & 6 \\ 4 & 6 & 11 \end{bmatrix}$ by reducing it to row echelon form. **10**

(b) Find the area between the parabola $y = x^2 + 3$ and the line $y = x + 3$. **10**

6. (a) A husband and wife appeared in an interview for two vacancies in an office. **10**
The probability of husband's selection is $\frac{1}{7}$ and that wife's selection is $\frac{1}{5}$.
Find the probability that (i) both of them are selected and (ii) only one of them is selected.

(b) Food I has 1 unit of vitamin A, 3 units of Vitamin B and 4 units of Vitamin C. **10**
Food II has 2,4 and 5 units respectively while Food III has 3, 0 and 3 units respectively. For a certain diet 11 units of Vitamin A, 9 of Vitamin B and 20 of C are required. Find amount of 3 foods that will provide exactly three amounts of the vitamins.

7. (a) Two fair dice are rolled. If X denotes the sum of the numbers appearing on the uppermost faces of the dice, find (i) $P(X < 4)$, (ii) $P(X \geq 10)$, (iii) $P(3 < X < 7)$, (iv) $P(X > 3)$. **10**

(b) Solve the following : **10**

(i) $\lim\limits_{x \to 0} \dfrac{\log(2+x) - \log(2-x)}{\tan x}$ (ii) $\lim\limits_{x \to 0} \dfrac{3^x - 3^{-x}}{\sin x}$.

8. (a) Solve the following : **10**

(i) $\int_0^\infty x^2 e^{-x}\, dx$. (ii) $\int_0^1 x^2 (1-x)^4\, dx$.

(b) Solve for x the equation, $(x - 1)(x - 2)(x - 3)(x - 4) = 360$. **10**

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F.Y.P.G.D.O.R.M.

July 2017

Con. 364-17. Statistic for Management (Paper - II) BC-5387

(3 Hours) [Total Marks : 100

N.B. : (1) Attempt any **five** questions.
(2) **All** questions carry **equal** marks.
(3) Use of **non-programmable calculator** is **permitted.**
(4) **Statistical tables** and **graph papers** will be **supplied** on **request.**

1. (a) Obtain Karl Pearson's coefficient of Skewness from the following data :— **10**

Size of the item	7·4	8·4	9·4	10·4	11·4	12·4	13·4
Frequency	2	6	20	14	8	6	4

(b) Obtain Karl Pearson's coefficient of correlation for the following data :— **10**

Age in years	40	45	50	55	60	65	70
Blood Pressure	125	140	140	145	145	160	160

2. (a) Calculate coefficient of correlation between the expenses and savings of any family. **10**

Expenses ₹	10	18	27	39	46
Savings ₹	70	55	47	28	20

(b) The following table gives the age of bikes and annual maintenance costs. Obtain the regression equations. Also find out the maintenance cost of a bike whose age is 12 years old. **10**

Age of Bike (in years)	2	5	7	11	15
Maintenance cost (in '000 ₹)	1	3	5	8	10

3. (a) Suppose that a manufactured products has 2 defects per unit of product inspected. Using Poisson distribution, calculate the probabilities of finding a product without any defect, 3 defects and 4 defects. (Given $e^{-2} = 0{\cdot}135$) **7**

(b) A Store receives 3 red, 6 white and 7 blue Shirts. Two shirts are drawn at random. Determine the probability that :— **7**
(i) Both the Shirts are white.
(ii) Both the Shirts are blue.
(iii) One Shirt is red and the other is white.
(iv) One Shirt is white and the other Shirt is blue.

(c) The weekly wages of 1000 workmen are normaly distributed around a mean of ₹ 70 and with a standard deviation of ₹5. Estimate the number of workers whose weekly wages will be :— **6**
(i) More than ₹ 75
(ii) Less than ₹ 63

[TURN OVER

4. (a) Calculate the expected frequencies for the following data resuming the two attributes viz., condition of home and condition of child as independent. **10**

Condition of Child	Condition of Home	
	Clean	Dirty
Clean	75	45
Fairly Clean	80	20
Dirty	30	50

Use Chi-Square test at 5% level of state whether the two attributes are independent.

(Table values of Chi-Square at 5% for 2 degrees of freedom is 5·991 and for 3 degrees of freedom is 7·815 and for 4 degrees of freedom is 9·488).

(b) An agency conducting weight reduction programme claims that participants in their programme achieve weight reduction of atleast 6 kg after two weeks of the programme. In evidence, they have given the following data, on 10 participants who have undergone this programme. On the basis of this sample evidence, can the claim of the agency on weight reduction be said to be valid ? (t_{tab} at 5% level of significance = 2·26) **10**

Before (kg)	85	91	99	92	87	79	87	92	95	106
After (kg)	76	83	81	86	79	73	79	85	95	96

5. (a) The mean weekly sale of Soap bars in departmental Stores was 146·3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153·7 and showed a standard deviation of 17·2. Was the advertising campaign successful ? (Given tabulated value of ϵ for 21 degrees of freedom at 5% level of significance = 1·72) **10**

(b) In a random sample of 1,000 persons from town A, 400 are found to be consumers of wheat. In a sample of 800 from town B, 400 are found to be consumers of wheat. Do these data reveal a significant difference between town A and town B, so far as the proportion of wheat consumers are concerned ? **10**

6. Four machines A, B, C and D are used to produce a certain kind of cotton fabrics. Samples of size 4 with each unit as 100 square meters are selected from the outputs of the Machine at random, and the number of flows in each 100 square meters are counted, with the following result :— **20**

A	B	C	D
11	7	12	16
9	9	11	20
14	10	18	23
16	4	9	21

Do you think that there is a significant difference in the performance of the four machines ?

[TURN OVER

7. (a) Fit a linear trend by the method of least squares to the following data. Assuming that the same rate of change continues. What would be the predicted earnings for the year 1985 ? **10**

Year	1977	1978	1979	1980	1981	1982	1983	1984
Earnings (in ₹ in Lakhs)	38	40	65	72	69	60	87	95

(b) The following table gives the inspection of data on completed spark plugs :— **10**
(2000 spark plugs in 20 lots of 100each)

Lot No.	No. of Defectives	Fraction Defectives	Lot Number	No. of Defectives	Fraction Defectives
1	5	0·050	11	4	0·040
2	10	0·100	12	7	0·070
3	12	0·120	13	8	0·080
4	8	0·080	14	2	0·020
5	6	0·060	15	3	0·030
6	5	0·050	16	4	0·040
7	6	0·060	17	5	0·050
8	3	0·030	18	8	0·080
9	3	0·030	19	6	0·060
10	5	0·050	20	10	0·100

Construct an appropriate control chart.

8. Write short notes on the following (any **four**) :— **20**
   (a) Advantages and disadvantages of Mean Deviation.
   (b) Applications of Poisson Distribution.
   (c) Type I and Type II Errors.
   (d) Difference between correlation and Regression.
   (e) ANOVA and its assumptions.
   (f) Properties of Regression Coefficients.

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F.Y.P.G.D.O.R.M.

Managerial Economics and Accounting (Paper-III)

July 2017

Con. 365–17. BC–5729

(3 Hours) [Total Marks : 100

N.B. :(1) In **Section I**, Question number **1** is **compulsory**. Attempt any **two** from the remaining **four** questions from **Section - I**. In **Section - II**, Question No. **6** is **compulsory**. Attempt any **two** from the remaining **four** questions from **Section - II**. Attempt **Six** questions in **all**.

(2) Answers to **two** Sections should be written in the **same** Answer Book.

(3) **Figures** to the **right** indicate **full** marks.

(4) Use of **Calculator** is **permitted**.

Section - I (Marks 50)

1. (a) Explain in brief the following concepts relevant to managerial decision making. **9**
   (i) Law of Demand
   (ii) Price elasticity of demand
   (iii) Cobb-Douglas Production function.
   (b) Distinguish between the following : **9**
   (i) Joint demand and composite demand
   (ii) Short run and long run Production Function
   (iii) Marginal Revenue and Average revenue.

2. (a) Discuss how changes in both demand and supply can change equilibrium price. Use diagrams. **8**
   (b) Bring out the relationship between price elasticity of demand and total revenue. Illustrate with suitable diagram. **8**

[TURN OVER

3. (a) What is meant by demand forecasting ? Discuss the steps involved in demand forecasting. 8

(b) Fit a trend line for the following series— 8

(i) Estimate value for 1995

(ii) What is the monthly increase in production ?

Year	1988	1989	1990	1991	1992	1993	1994
Production of Steel (in tonners)	125	128	133	135	140	141	143

4. (a) What is meant by Economies of Scale ? Bring out the classification of Internal Economies of Scale. 8

(b) Given the Production function $Q = f(x_1, x_2) = x_1^2 x_2^3$ where x_1, x_2 are two in puts and Q is production. Does this show constant decreasing, or increasing returns to scale ? 4

(c) Do each of the following production function exhibit decreasing constant or increasing returns to scale ? 4

(i) $Q = 0.5$ KL (b) $Q = 2k + 3L$

5. (a) "The Learning Curve describes reduction in cost percent of output as a firm's cumulative output over successive time periods increases, while output per period may remain the same." Elaborate with example the learning curve. 8

(b) Explain how equilibrium price is determined under Perfect competition. 8

Section — II (50 Marks)

6. (a) Explain briefly the following concepts : 9
   (i) Features of monopolistic competition.
   (ii) Equilibrium of the monopoly firm in the short and long run.
   (iii) Production cost under monopolistic competition.
   (b) Distinguish between the following :— 9
   (i) Depression and recovery phase of a business cycle.
   (ii) Perfect competition and monopolistic competition.
   (iii) Debt capital and evality capital.

7. (a) Explain the conditions under which price discrimination is both possible and protitable ? 8
   (b) What is meant by Price descrimination ? Classify them. 8

8. (a) Analyse the role of OPEC as a cartel under Oligopoly Market. 8
   (b) What is meant by monopolistic Competition ? Explain the features of monopolistic competition. 8

9. (a) What is meant by cost of Capital ? Discuss the problems in determining the cost of capital. 8
   (b) Define the meaning of Project appraisal and discuss discounted cash flow technique for appraising a project. 8

10. (a) PCT Ltd. provides you the following information for the year ending 31st March, 2008. 8

Normal Capacity	=	2000 units
Production and Sales	=	2000 units
Selling Price per unit	=	₹ 10
Direct Material	=	₹ 2000
Direct Wages	=	₹ 2000
Direct Expenses	=	₹ 1600

[TURN OVER

Factory Overheads (15% variable) = ₹ 4000

Office and Administration Expenses (80% fixed) = ₹ 4000

Selling and Distribution on Expenses (75% fixed) = ₹ 4000

Calculate the following :—

(i) Break - Even point (in units)

(ii) Break - Even point (in %)

(iii) Margin of Safety (in ₹)

(iv) Margin of Safety (in %)

(b) Explain the Pay Back Period Method of appraising capital expenditure of projects and calculate the pay back period for the following. 8

A project costs ₹ 5,00,000 and yields annual profit of ₹ 80,000 after depreciation @ 12% p.a. but before tax of 50%.

F.Y.P.G.D.O.R.M.

July 2017

Con. 221-17. Basic Operation Research (Paper-IV) BC-5237

(3 Hours) [Total Marks : 100

N.B. :(1) Attempt any **five** questions.
(2) **All** questions carry **equal** marks.
(3) **Figures** to the **right** show marks to a **question/sub-questions.**
(4) Use of handheld **scientific, non-programmable** calculator is **allowed.**
(5) Graph paper will be **provided** on **request.**

1. (a) A firm produces two product P and Q. Daily production upper limit is 600 units for total production. But at least 300 total units must be produced every day. Machine hours consumption per unit is 6 for P and 2 for Q. Atleast 1200 machine hours must be used daily. Manufacturing cost per unit is Rs. 500 for P and Rs. 200 for Q. Formulate as Linear programming problem. Do not solve it. **10**

(b) Solve the following Game. Find the value of the Game. **10**

	B's Strategy				
		B_1	B_2	B_3	B_4
A's Strategy	A_1	2	-4	6	-3
	A_2	-3	4	-4	1

2. (a) A small Project consists of seven activities. Optimistic, Most Likely and Pessimistic Time Estimates are given for each activity. **10**

Activity	Preceding Activity	Time (days)		
		Optimistic	Most likely	Pessimistic
A	–	2	5	8
B	–	2	5	14
C	A	4	6	14
D	A	5	7	15
E	B,C	2	3	10
F	D	3	3	3
G	E	1	2	3

(i) Draw PERT network and identify the Critical Path.
(ii) Find Expected Duration and the Variance of the project.
(iii) If the project manager wants an assurance of 95% that the project is completed on time, how many days before the scheduled date he should start the project ? (Given $Z_{0.95} = 1.64$)

[TURN OVER

(b) Use the graphical method to solve the following Linear Programming Problem. 10

Minimize $Z = 40x + 80y$

Subject to

$6x + y \geq 18$

$x + 4y \geq 72$

$2x + y \geq 10$

$x, y \geq 0$

3. (a) Define the following terms with reference to the Simplex method in Linear Programming. 10

(i) Artificial Variable (ii) Multiple Optimal Solutions (iii) Degenerate Solution

(iv) Surplus Variable (v) Unbounded Solution

(b) Obtain the dual for the following Linear Programming Problem : 10

(i) Maximize $Z = 30x_1 + 40\ x_2$

Subject to $4x_1 + 5x_2 \leq 50$

$5x_1 + 3x_2 \leq 90$

$x_1, x_2 \geq 0$

(ii) Maximize $Z = 20x_1 + 10\ x_2$

Subject to $5x_1 + 6x_2 \geq 40$

$3x_1 + 7x_2 \geq 60$

$x_1, x_2 \geq 0$

4. (a) The table gives the transportation cost per unit from the origin to the destination and Demand and suppy values. Obtain Initial Basic Feasible Solution by Vogel's Approximation Method. 10

Origin\Destination	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

(b) A Department head has four tasks to be performed and three subordinates. The subordinates differ in efficiency. The estimates of the time, each subordinate would take to perform, is given below in the matrix. How should he allocate the tasks, one to each man, so as to minimize the total man-hour ? 10

Tasks	Men		
	9	26	15
	13	27	6
	35	20	15
	18	30	20

5. A company has four districts P, Q, R and S to sell its product and four salesmen A, B, C and D for it. The district-wise sales record of each salesman is as given in the table. Determine their allocation so as to make the sales maximum. What will be the total maximum sale ? **20**

Salesman	Districts			
	P	Q	R	S
A	420	350	280	210
B	300	250	200	150
C	300	250	200	150
D	240	200	160	120

6. Using Simplex Method, Solve the following Linear Programming Problem : **20**

Maximize $Z = 100x_1 + 80\ x_2$

Subject to

$$3x_1 + 2x_2 \leq 3600$$
$$x_1 + 2x_2 \leq 2000$$
$$x_1, x_2 \geq 0$$

7. The following table shows the details of a Project, Indirect Cost is Rs. 200 per week. **20**

Activity	Normal		Crash	
	Time (Weeks)	Cost (Rupees)	Time (Weeks)	Cost (Rupees)
1–2	8	1500	6	2000
1–4	10	2000	7	3000
2–4	5	800	4	1400
2–3	6	1100	4	1500
2–5	8	900	5	1500
3–4	0	0	0	0
4–6	12	300	8	400
5–6	5	500	4	800

(i) Construct the project network, what is the normal duration and corresponding total cost of the project ?

(ii) Crash the project systematically and find out the minimum cost and associated time and also find out additional costs required to reach optimal time.

(iii) Also find the minimum time and associated cost.

[TURN OVER

8. (a) From the following final Optimal Simplex Table, Obtain the original Linear Programming Problem. **10**

C_j			300	110	0	0
Profit per Unit C_B	Solution values b (=xB)	Variable in Basis B	X_1	X_2	S_1	S_2
300	1/10	X_1	1	0	-1/20	1/40
110	6/10	X_2	0	1	1/10	-3/20
Z=96	C_j-z_j		0	0	4	9

(b) A road transport company has one reservation clerk on duty at a time. He handles information of bus schedules and makes reservations. Customers arrive at a rate of 8 per hour and the clerk can serve 12 customers on an average per hour. Answer the following : **10**

(i) What is the average number of customers waiting for the service of the clerk ?

(ii) What is the average time a customer has to wait before getting service ?

(iii) A management is contemplating to install a computer system to handle the information and reservations. This is expected to reduce the service time from 5 to 3 minutes. The additional cost of having the new system works out to Rs. 50 per day. If the cost of goodwill of having to wait is estimated to be 12 paise per minute spent waiting before being served, should the company install the computer system ? Assume 8 hours working day.

F.Y.P.G.D.O.R.M.

July 2017

Con. 399-17. Basic Operation Research BC-5304

Paper-V

Max Time : 3 hours Max marks : 100

N B 1) Attempt any 5 Questions

2) Figure to the right indicates marks to a Question / Sub – Question .

3) All Questions carry equal Marks.

4) Use of Scientific Handheld Non Programmable Calculator is allowed.

Q.1 (a) The following data refers to the price per dozen and quantity sold of bananas in a certain market on 12 consecutive days. (10)

Price in Rs Per Dozen	Quantity (in dozens
100	55
90	70
80	90
70	100
70	90
70	105
70	80
65	110
60	125
60	115
55	130
50	130

Estimate the Regression line of Quantity on Price.

Q. 1 (b) A fleet of 6 $\frac{1}{2}$ ton capacity trucks each costing Rs. 45,000 has the following particulars: (10)

Year	Resale Value (Rs.)	Hired Kilometers	Total Kilometers	Maintenance Cost (Rs.)	Fuel Cost per Km. (Rs.)
1	35,000	36,000	43,000	2,000	0.45
2	30,000	33,000	40,000	4,000	0.45
3	26,000	27,000	33,000	8,000	0.50
4	23,000	23,000	28,000	7,000	0.53
5	20,000	23,000	27,000	12,000	0.55
6	17,000	20,000	24,000	13,000	0.55

[TURN OVER

The driver cum cleaner charges = Rs. 2600 per year plus Re. 0.07 per hired km. Hire charges = Rs. 1.75 per km. Assuming that the truck is bought with borrowed capital at 10% interest per annum Find the economic life for One truck only. It is assumed that the expenditure is incurred at the middle of the year and the Resale value is obtained at the end of the year. Discounted values for i = 10% are given below.

t	1	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5
$\frac{1}{(1.1)^{t-0.5}}$	.95	.91	.87	.83	.79	.75	.72	.68	.65	.62	.59	.56

Q. 2(a) Given the following data for an item of uniform demand, instantaneous delivery time and back order facility : Annual Demand = 800 units, Cost of an Item = Rs. 40, Ordering Cost = Rs. 800, Inventory Carrying Cost = 40% Back Order Cost = Rs. 10. (10)

Find out : (i) Minimum cost order quantity, (iii) Maximum inventory level.

(ii) Maximum number of back orders. (iv) Time between orders, and

(v) Total annual cost.

Q. 2 (b) A Businessman is considering taking over a certain new business. Based on the past information and his own knowledge of the business, he works out the probability distribution of the daily Costs and Sales Revenue, as given here: (10)

Costs (in Rs.)	Probability	Sales Revenue	Probability
8,500	0.10	9,500	0.10
9,000	0.10	10,000	0.10
9,500	0.40	10,500	0.20
10,000	0.20	11,000	0.40
10,500	0.20	11,500	0.15
		12,000	0.05

Use the following Sequence 1 and Sequence 2 of random numbers for estimating Costs and Sales Revenue respectively. Obtain the probability distribution of the daily Net Revenue.

Sequence 1 : 81, 83, 27, 81, 35, 91, 72, 90, 62, 28.

Sequence 2 : 38, 71, 28, 70, 82, 18, 71, 91, 58, 48.

Q. 3. (a) A manufacturing company purchases 9,000 parts of a machine for its annual requirements ordering one month usage at a time. Each part costs Rs. 20. The ordering cost per order is Rs. 15, and the carrying charges are 15% of the average inventory per year. You have been asked to suggest a more economical purchasing policy for the company. What advice would you offer, and how much would be the savings of the company per year? (10)

Q. 3 (b) We have seven jobs each of which has to go through the machines M_1 and M_2 in the order M_1, M_2 .Processing times (in hours) are given as : (10)

Job	:	1	2	3	4	5	6	7
Machine M_1	:	3	12	15	6	10	11	9
Machine M_2	:	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elapsed time T.

Q. 4 (a) A truck has been purchased at a cost of Rs. 1,60,000. The value of the truck is depreciated in the first three years by Rs. 20,000 each year and Rs. 16,000 per year thereafter. Its maintenance and operating costs for the first three years are Rs. 16,000, Rs. 18,000 and Rs. 20,000 in that order and increase by Rd. 4,000 every year. Assuming an interest rate of 10% find the economic life of the truck. (10)

Q. 4(b) Find the sequence that minimizes the Total Elapsed Time (in hours) required to complete the following tasks on the machines M_1, M_2, M_3 in the order M_1, M_2, M_3 (10)

Machine	M_1	5	7	6	9	5
	M_2	2	1	4	5	3
	M_3	3	7	5	6	7

Q. 5(a) Month wise demand during 11 months of a year is given (10)

i) Forecast the demand for the 12th month by taking $\alpha = 0.1$ and 0.5

ii) Compute M. A. D.

iii) Compute M. S. E.

iv) Comment on the value of α

Month	**Actual Demand in (Units)**
1	4000
2	2700
3	3900
4	3950
5	6200
6	3500
7	3100
8	2600
9	4400
10	5440
11	4700

Q. 6 Following failure rates have been observed for a certain type of light bulbs : (20)

Week	:	1	2	3	4	5
Per cent failing by the end of the Week	:	10	25	50	80	100

There are 1000 bulbs in use, and it costs Rs. 10 to replace an individual bulb which has burnt out. If all the bulbs were replaced simultaneously it would cost Rs. 4 per bulb. It is proposed to replace all the bulbs at fixed intervals of time, whether or not they have burnt out and to continue replacing burnt out bulbs as and when they fail. At what intervals all the bulbs should be replaced? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy?

Q. 7 The director of finance for a farm cooperative is concerned about the yields per acre she can expect from this year's corn crop. The probability distribution of the yields for the current weather conditions is given below : (20)

Yield in kg. per acre	:	120	140	160	-180
Probability	:	0.18	0.26	0.44	0.12

She would like to see a simulation of the yield she might expect over the next 10 years for weather conditions similar to those she is now experiencing.

(i) Simulate the average yield she might expect per acre using the following random numbers :
20, 72, 34, 54, 30, 22, 48, 74, 76, 02.
She is also interested in the effect of marketprice fluctuations on the cooperative's farm revenue she makes this estimate of per kg. prices for corn.

Price per kg. (Rs.)	:	2.00	2.10	2.20	2.30	2.40	2.50
Probabilities	:	0.05	0.15	0.30	0.25	0.15	0.10

(ii) Simulate the price she might expect to observe over the next 10 years using the following random numbers :
82, 95, 18, 96, 20, 84, 56, 11, 52, 03

Q. 8 Explain the following (Any Two) (20)

1) Heuristic Programming

2) Inventory Parameters

3) Forecasting Models

4) Reasons for replacing an equipment

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