



Diploma in Statistical Process Control and Operations Research (DSPCOR)
Examination, August 2009
PRACTICAL

Time : 3 Hours

Max. Marks : 90

*Instructions : 1) Answer any three main questions.
2) Each question carries 30 marks.*

1. a) Represent the following data by component bar diagrams :

Cost per scooter on items	Price (Rs.)	
	1990	2000
Raw material	2,000	3,000
Labour	540	1,275
Direct Expenses	360	930
Factory Expenses	500	840
Office Expenses	280	750

b) Draw a histogram for the following data and find the mode. Verify the mode by formula method.

Monthly wages

in '000 Rs. :	11-13	13-15	15-17	17-19	19-21	21-23	23-25
No. of workers :	6	53	85	56	21	16	8

P.T.O.



2. a) For 50 airplanes that arrived late at an airport during the first week, the time by which they were late was observed.

Time (min.) :	0-20	20-40	40-60	60-80	80-100
No. of airplanes :	14	18	09	05	04

Find the Mean and the Median. Hence find the value of the mode using empirical relation.

- b) Calculate Bowley's co-efficient of skewness for the following data :

Marks	No. of Students
Above 0	180
Above 15	160
Above 30	130
Above 45	100
Above 60	65
Above 75	20
Above 90	5

3. a) The runs scored by two cricketers A and B in 10 ODI Cricket matches are given below :

Cricketers A : 44 67 58 34 62 100 73 98 112 94

Cricketers B : 24 76 58 34 68 120 72 68 102 84

- Discuss : i) Who has better average score ?
ii) Who is more consistent ?

- b) Two judges A and B in a beauty contest rank the 10 competitors in the following order :

Competitor no. :	1	2	3	4	5	6	7	8	9	10
Judge A :	6	4	3	1	2	7	9	8	10	5
Judge B :	4	1	6	7	5	8	10	9	3	2

What is Spearman's rank correlation ?



4. a) The ESR (erythrocyte) sedimentation rate (mm/hour) of 15 male and 10 female is given below. Test the significance of the difference in the means at 5% level of significance.

Males : 65, 60, 115, 82, 43, 103, 125, 118, 83, 75, 90, 95, 95, 128, 65, 84.

Females : 63, 85, 90, 100, 90, 105, 98, 93, 100 and 125.

- b) The following table gives the classification of 200 fishes according to the sex and the helminth infection. Test whether infection is independent of the sex of the fish.

Sex	Infected	Uninfected
Males	65	45
Females	35	55

5. a) Nominal 100 watt electric light bulbs are being manufactured by an automatic machine. 10 random samples each of 4 bulbs, were tested to determine accurately their electrical power consumption, with the following results :

Sample no. :	1	2	3	4	5	6	7	8	9	10
Mean :	0.55	0.15	0	0	-0.01	-0.05	4.00	0.20	0.115	0.35
Range :	1.0	0.9	1.1	2.0	1.1	0.6	1.3	0.9	0.6	1.8

Construct mean and range charts and indicate whether the process is under control.

- b) A large number of samples of 200 items each taken from a process that has a percentage non-conforming of 10%. A production order for 12 days are given below. Analyze the data on a np-chart.

Production order no. :	1	2	3	4	5	6	7	8	9	10	11	12
L of size :	200	200	200	200	200	200	200	200	200	200	200	200
Number of rejects :	23	15	17	15	41	0	25	31	23	0	8	16



6. a) Solve the following by graphical method.

$$\text{Minimize } Z = 1.5 X_1 + 2.5 X_2$$

$$\text{Subject to } X_1 + 3X_2 \geq 2$$

$$X_1 + X_2 \geq 2$$

$$X_1, X_2 \geq 0$$

b) A company has 6 jobs to be done on 6 machines ; any job can be done on any machine. The time in hours taken by the machine for the different jobs are as given below. Assign the machines to jobs so as to minimize the total machine hours.

	Jobs					
Machines	1	2	3	4	5	6
1	2	6	7	3	8	7
2	6	1	3	9	7	3
3	3	6	5	7	3	5
4	2	2	7	8	4	8
5	4	9	6	8	7	6
6	7	5	5	7	7	5
