

(6 pages)

APRIL 2023

66418/KD22B/
KB22B/KF22B

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer any TEN questions.

1. What is meant by Random Experiment?
2. Define a Binomial Distribution.
3. What is decision-making process in statistics?
4. State the meaning of Stratified Sampling.
5. What is the meaning of Sample Size?
6. What is one tailed test?
7. A person throws ten dice 500 times and obtains 2560 times 4, 5 or 6. Can this be attributed to fluctuations of sampling?
8. We have, $r_{12} = 0.30$, $r_{13} = 0.18$ and $r_{23} = 0.41$, then Calculate $R_{1.23}$.
9. Define Correlation.
10. Define ANOVA.
11. State the meaning of Linear Programming.
12. Mention any two uses of Assignment Problem.

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18. Calculate Karl Pearson's Correlation Co-efficient from the following data :

X : 10 12 18 24 23 27
Y : 13 18 12 25 30 10

19. A company manufactures two products A and B. Both products are processed on two machines M1 and M2.

	M1	M2	Profit per Unit
M1	6 Hrs/Unit	4 Hrs/Unit	Rs. 100
M2	2 Hrs/Unit	4 Hrs/Unit	Rs. 80
Availability	7200 Hrs/month	4000 Hrs/month	

Find out the monthly production of A and B to maximise profit by graphical method.

PART C — (4 × 10 = 40 marks)

Answer any FOUR questions.

20. Given the following Payoff tables : where the table represents profits.

Alternatives	States of nature			
	S1	S2	S3	S4
A1	3	5	8	-1
A2	6	5	2	0
A3	0	5	6	4

PART B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Two friends Harish and Kalyan appeared for an exam. Let A be the event that Harish is selected and B is the event that Kalyan is selected. The probability of A is $\frac{2}{5}$ and that of B is $\frac{3}{7}$. Find the probability that both of them are selected.
14. Five unbiased coins are tossed 64 times. Calculate the expected frequencies for the number of heads obtained.
15. Define Sampling Error and explain different types of sampling error.
16. A light bulb company claims that the 100-watt light bulb it sells has an average life of 1200 hours with a standard deviation of 100 hours. For testing the claim 50 new bulbs were selected randomly and allowed to burn out. The average lifetime of these bulbs was found to be 1180 hours. Is the company's claim is true at 5% level of significance?
17. A random sample of size 16 as 53 as mean. The sum of the squares of the deviations taken from mean is 135. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limit of the mean of the population. (For $\nu = 15$, $t_{0.05} = 2.13$)

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State which can be chosen as the best act using;

- (a) Maximax;
- (b) Maximin;
- (c) Minimax Regret;
- (d) Laplace and
- (e) Hurrwicz Alpha criterion = 0.4

21. Describe various methods of sampling

22. In order to determine the possible effect of a chemical treatment on the rate of germination of cotton seeds a pot culture experiment was conducted. The results are given below

Chemical treatment and germination of cotton seeds

	Germinated	Not Germinated	Total
Chemically treated	118	22	140
Untreated	120	40	160
Total	238	62	300

Does the chemical treatment improve the germination rate of cotton seeds at 1% level? ($X^2(1)$ df at 1% L.O.S = 6.635)

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[P.T.O.]

23. The following table gives you the aptitude test scores and productivity indices of 10 workers selected at random:

Aptitude	60	62	65	70	72	48	53	73	65	81
Test scores (X)										
Productivity										
Index (Y)	68	60	32	80	85	40	52	62	60	61

Calculate the two regression equations and estimate the productivity index of a worker whose test score is 92.

24. A Company has three factories A, B and C which supply to four warehouses situated at P, Q, R and S. The monthly production capacity (tons) of A, B, and C are 120, 80 and 200 respectively. The monthly requirements (tons) for the warehouses P, Q, R and S are 60, 50, 140 and 50 respectively. The transportation cost (Rs. Per ton) matrix is given below:

Warehouses	Factories		
	A	B	C
P	4	3	7
Q	5	8	4
R	2	4	7
S	5	8	4

Using Vogel's method, determine the optimum distribution of products to warehouses to minimize the total transportation cost.

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25. Four Salesmen are to be assigned to four districts. Estimates of the sales revenue in hundreds of rupees for each are as under:

Salesmen	Districts			
	A	B	C	D
1	320	350	400	290
2	400	250	300	220
3	420	270	340	300
4	280	390	410	350

Give the Assignment Pattern that maximize the sale revenue.

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