

M.C.A.- I (Two Years Programme) (New CBCS Pattern) Semester - I  
**PSMCAT104.1 - Elective-I Paper-IV : Operational Techniques**

P. Pages : 2

Time : Three Hours



**GUG/S/23/13638**

Max. Marks : 80

- Notes :
1. All questions are compulsory and carry equal marks.
  2. Draw neat and labelled diagrams wherever necessary.
  3. Avoid vague answers and write answers relevant and specific to questions only.

**Either :-**

1. a) Define Operational Research and write down its characteristics? **8**  
b) Explain different phases of Operational research. **8**

**OR**

- c) Explain Model and Modelling in operational Research. **8**  
d) Explain Mathematical Modelling in Operational research. **8**

**Either :-**

2. a) Explain measures of central tendency (mean, mode, median) **8**  
b) Define mode and calculate mode for the following series. **8**

Size	10-20	10-30	10-40	10-50	10-60	10-70	10-80	10-90
Freq:	4	16	56	97	124	137	146	150

**OR**

- c) Write steps to formulate a Graphical representation of Linear programming. **8**  
d) In Hockey matches, India and Australia have goals scored as follows. State which team is more consistent by calculating standard deviation and coefficient of variance? **8**

No. of Goals	0	1	2	3	4
India	24	9	8	5	4
Australia	20	8	6	4	2

**Either :-**

3. a) Write Mathematical formulation of Transportation model. **8**  
b) Explain Hungarian Method in detail. **8**

**OR**

- c) What are the different special cases of assignment problems? **8**

d) Determine IBFS of following transportation problem using VAM and LCM method.

8

From To	A	B	C	D	Supply
1	1	2	1	4	20
2	3	3	2	1	40
3	4	2	5	9	20
4	5	3	6	10	20
Demand	20	40	30	10	

**Either :-**

4. a) Explain the PERT method in detail.

8

b) What is the Critical path? Explain Critical path method analysis in detail.

8

**OR**

c) Explain Queuing theory and write characteristics of the Queuing system.

8

d) Explain the classification of queuing model.

8

5. Attempt **all** the questions.

a) Write scope and application of Operation Research.

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b) Explain the limitation of Linear programming.

4

c) Draw the flowchart of the Hungarian method.

4

d) Explain Poisson process and exponential distribution.

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