18COE20

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION MAY 2024
(Fourth Semester)

Branch – **e-COMMERCE**

OPERATIONS RESEARCH

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 Operations research is the application of _____methods to arrive at the optimal Solutions to the problems
(i) Economical (ii) Scientific
(iii) a & b both (iv) Artisitc

2 Hungarian Method is used to solve_____
(i) A travelling Salesman problem (ii) A LP problem
(iii) Both a & b (iv) A transportation problem

3 Replacement decision is very much common in this stage
(i) Infant stage (ii) Old age
(iii) Youth (iv) All the above

4 The time required by each job on each machine is called _____time
(i) Elapsed (ii) Idle
(iii) Processing (iv) Average

5 The longest path in the network diagram is called _____path
(i) best (ii) Critical
(iii) worst (iv) None of the above

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a List out the uses of Operations Research

OR

b A firm is engaged in producing two products. A and B. Each unit of product A requires 2 kg of raw material and 4 labour hours for processing, whereas each unit of B requires 3 kg of raw materials and 3 labour hours for the same type. Every week, the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields Rs.40 and one unit of product B sold gives Rs.35 as profit. Compute this as a Linear Programming Problem to determine as to how many units of each of the products should be produced per week so that the firm can earn maximum profit.

7 a Compute the initial solution for the following TP by using NWCM

	D_1	D_2	D_3	D_4	Supply
S_1	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
Demand	200	225	275	250	

OR

Cont...

7 b Compute the problem of assigning five jobs to five persons. The assignment costs are given as follows

		JOB				
		1	2	3	4	5
PERSON	A	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

8 a A firm is considering replacement of a machine, whose cost per year is Rs.12,200 and the scrap value is Rs. 200.The running (maintenance and Operating) costs in rupees are found from experiences to as follow.

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

OR

b What is group replacement and give an example.

9 a In a factory, there are six jobs to process, each of which should go to machines A & B in the order AB. The processing timings in minutes are given, determine the optimal sequencing & total elapsed time

Jobs	1	2	3	4	5	6
Machine A	7	4	2	5	9	8
Machine B	3	8	6	6	4	1

OR

b What do you understand by Kendall's notation in Queuing thoery?

10 a Outline the network for the project whose activities with their predecessor relationships are given below:

Activity	A	B	C	D	E	F
Predecessor	-	A	A	B	B,C	E

OR

b Expalin about network of crashing.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Solve the following LPP by the graphical method

Maximize $Z = 3x_1 + 2x_2$

Subject to constraints

$-2x_1 + x_2 \leq 1$; $x_1 \leq 2$; $x_1 + x_2 \leq 3$; and $x_1, x_2 \geq 0$

OR

b Solve the following lpp using simplex algorithm

Max $Z = 5x_1 + 10x_2 + 8x_3$

subject to

$3x_1 + 5x_2 + 2x_3 \leq 60$

$4x_1 + 4x_2 + 4x_3 \leq 72$

$2x_1 + 4x_2 + 5x_3 \leq 100$

and $x_1, x_2, x_3 \geq 0$

Cont...

12 a Compute the solution by using VAM method

	D1	D2	D3	D4	SUPPLY
S1	11	13	17	14	250
S2	16	18	14	10	300
S3	21	24	13	10	400
DEMAND	200	225	275	250	

OR

b 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. What advice would you offer and how much would it save the company per year?

13 a Distinguish between individual and group replacement Policies

OR

b A milk plant is offered an equipment A which is priced at Rs.60,000 and the costs of operation and maintenance are estimated to be Rs.10,000 for each of the first 5 years, increasing every year by Rs. 3000 per year in the sixth and subsequent years. If money carries the rate of interest 10% per annum what would the optimal replacement period?

14 a A machine operator has to perform 3 operations, Turning, Threading & Knurling on three machines A, B & C in the order ABC. Find the optimum sequences when the time in hours are given.

Jobs	**1**	**2**	**3**	**4**	**5**	**6**
Turning (M/C A)	3	12	5	2	9	11
Threading(M/C B)	8	6	4	6	3	1
Knurling (M/C C)	13	14	9	12	8	13

OR

b A TV repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs TV sets in the order in which they come in, and if the arrivals follow approximately Poisson distribution with an average rate of 10 per 8- hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average with the set just brought in?

15 a A project consists of the following activities and the time estimates. Draw the network, find the critical path and expected completion time.

Activity	1-2	1-3	1-4	2-4	2-5	3-5	4-5
t_o	2	3	4	8	6	2	2
t_m	4	4	5	9	8	3	5
t_p	5	6	6	11	12	4	7

OR

b Explain the role of crashing in a network analysis?

Z-Z-Z END