Exam Date & Time: 29-Sep-2020 (10:00 AM - 01:45 PM)

PSG COLLEGE OF ARTS AND SCIENCE

Note: Writing 3hrs: Checking & Inserting Image : 30mins

BSc DEGREE EXAMINATION MAY 2020
(Sixth Semester)

Branch - MATHEMATICS WITH COMPUTER APPLICATIONS
OPERATIONS RESEARCH [14MCU26]

Marks: 75   **Duration: 210 mins.**

SECTION A

Answer all the questions.

1)   Define linear programming problem (L.P.P).   (2)

2)   Define unbounded solution.   (2)

3)   What is optimal solution in Transportation problem?   (2)

4)   Write the mathematical formulation of assignment problem.   (2)

5)   Define value of game.   (2)

6)   Define saddle point.   (2)

7)   Define critical path.   (2)

8)   Write the expansion of PERT.   (2)

9)   What is called a customer?   (2)

10)   What are the states of the queueing system?   (2)

SECTION B

Answer all the questions.

11)   (5)

a)
Solve the following L.PP using graphically
Max $(z) = x_1 + 3x_2$
st $2x_1 + x_2 \leq 20$; $x_1 + 2x_2 \leq 20$; $x_1, x_2 \geq 0$.

[OR]
b)
Solve the following L.P.P using Simplex method.
Maximize $z = 4x_1 + 7x_2$
Subject to the constraints   (5)
$4x_1 + 3x_2 \leq 12$; $3x_1 + 4x_2 \leq 12$ and $x_1, x_2 \geq 0$.

12)

Solve the transportation problem by using NWCR.

a)

	S_1	S_2	S_3	S_4
W_1	5	4	2	6
W_2	4	7	6	8
W_3	2	5	8	12
W_4	8	6	7	4
W_5	8	10	12	30

(5)

[OR]
b)
Solve the following assignment problem:

	W	X	Y	Z
A	11	17	8	16
B	9	7	12	6
C	13	16	15	12
D	14	10	12	11

(5)

13)

Solve the following game

a)

Player A   Player B

$$\begin{bmatrix} 12 & 1 & 30 & -10 \\ 20 & 3 & 10 & 5 \\ -5 & -2 & 25 & 0 \\ 15 & -4 & 10 & 6 \end{bmatrix}$$

(5)

[OR]
b)
Using the principle of dominance solve the following game $\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 8 & 12 \\ 13 & 12 & 14 & 13 \end{bmatrix}$ (5)

14)

Construct the project network.

a)

Activity:	A	B	C	D	E	F	G	H
Predecessor:	-	A	A	B	B	D,E	D	C,F,G

(5)

[OR]
b)
What are the difference between PERT and CPM?   (5)

15)
What are the models involving in Queueing systems?

                                                          (5)

a)

.[OR]

b)   A T.V repairman finds that the time spent on his job has an exponential distribution function with mean 30 minutes. If he repairs sets in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hours day.   (5)
(i) how many jobs are ahead of the set just brought in?
(ii) What is the repairman's expected idle time each day?

SECTION C

Answer 3 out of 5 questions.

16)

Solve the following L.P.P by dual simplex method:

Minimize $z = 3x_1 + 2x_2$

St $7x_1 + 2x_2 \geq 30$; $5x_1 + 4x_2 \geq 20$; $2x_1 + 8x_2 \geq 16$ and $x_1, x_2 \geq 0$.   (10)

17)

Solve the following transportation problem:

	E	F	G	Availability
A	10	9	8	8
B	10	7	10	7
C	11	9	7	9
D	12	14	10	4
Requirements	10	10	8	

(10)

18)

Solve the following using graphical method:

$$\begin{array}{c} \quad\quad B_1 \; B_2 \; B_3 \; B_4 \; B_5 \\ \begin{array}{c} A_1 \\ A_2 \end{array} \begin{bmatrix} 2 & -2 & 3 & 7 & 6 \\ 6 & 5 & 1 & 4 & 0 \end{bmatrix} \end{array}$$

(10)

19)

The following table gives the activities of a construction project and duration (in days):

Activity:	1-2	1-3	2-3	2-4	3-4	4-5
Duration:	20	25	10	12	6	10

(10)

Draw the network diagram and find the critical path.

20)

Customer arrive at a Bank Counter manned by a single person according to a poisson input process with a mean rate of 10 per hour. The time required to serve a customer has an exponential distribution with mean of 4 minutes. Find   (10)
(i) the average number in the system.
(ii) the average waiting time of a customer in the queue.
(iii) the probability that there would be a customer in the queue.

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