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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BCOM DEGREE EXAMINATION DECEMBER 2019
(Second Semester)

Branch - BUSINESS ANALYTICS

OPTOMIZATION TECHNIQUES

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Time: Three Hours   Maximum: 75 Marks

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SECTION-A (IQ Marksl
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (10 x 1 = 10)

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1   In linear programming, constraints can be represented by
     (i) equalities (ii) inequalities   (iii) ratios   (iv) both (i) and (ii)

2   The linear function of the variables which is to be maximize or minimize is called___
     (i) constraints   (ii) objective function
     (iii) decision variable   (iv) none of above

3   The solution to a transportation problem with m resources and n destinations is
     feasible , if the number of allocations are
     (i)   m+n-1 (ii) m+n+1   (iii) m+n (iv) mxn

4   If there are n workers and n jobs, there would be_____ solutions.
     (i) n   (ii)n!   (iii) (n-1)!   (iv) $(n!)^n$

5   When maximin and minimax values of the game are same, then____
     (i) there i/a saddle point   (ii) solution does not exist
     (iii) strategies are mixed   (iv) none of the above

6   A mixed strategy game can be solved by
     (i)   matrix method   (ii)   algebraic method
     (iii)   graphical method   (iv)   all of the above

7   If an activity has zero slack, it implies that
     (i)It is a dummy activity   (ii) it lies on the critical path
     (iii) there are more than one critical paths (iv) the project is progressing well

8   In PERT the activity duration follows
     (i)Binomial distribution   (ii)   Poisson distribution
     (iii)   Beta distribution   (iv)   Normal distribution

9   A sequencing problem involving six jobs and three machines requires evaluation of
     (i)   6! sequences   (ii) $(6!)^2$ sequences
     (iii) $(6!)^3$ sequences   (iv) $(6!)^n$ sequences

10   In sequencing problem the time for which a machine does not have process is called
     (i)   processing time   (ii)   elapsed time
     (iii)   idle time   (iv)   total time

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SECTION - B (25 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

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11 a A firm manufactures headache pills in two sizes A and B. A contains 2 grains of
      aspirin, 5 grains of bicarbonate and 1 grain of codeine. Size B contains 1 grain of
      aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by users that it
      requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of
      codeine for providing immediate effect. It is required to determine the least number
      of pills a patient should take to get immediate relief. Formulate the problem as a
      standard LPP.

<div align="center">OR</div>

   b Reduce the following LPP to its standard form:
     Maximize $Z^*=3x_1+4x_2+6x_3$
     subject to the constraints $2x_1+x_2+2x_3>6$,
                             $3x_1+2x_1=8$.

12 a Determine an initial basic feasible solution to the following transportation problem using north west comer method:

	D_1	D_2	D_3	D_4	Availability
0_1	5	3	6	2	19
0_2	4	7	9	1	37
0_3	3	4	7	5	34
Demand	16	18	31	25	

OR

b Solve the following assignment problem.

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

13 a Determine whether the following two-person zero sum game is strictly determinable. Give optimum strategies for each player in the case & strictly determinable.

Player B

Player A
$\begin{matrix} 5 & 0 \\ 4 & 2 \end{matrix}$

OR

b Determine the optimum strategies and the value of the game

$P_1 \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} P_2$

14 a Define (i) Predecessor activity (ii) Successor activity (iii) Dummy activity.

OR

b Construct the network diagram comprising activities B,C,...Q and N such that the following constraints are satisfied:

B<E,F; C<G,L; E,G<H; L,H<I; L<M; H<N; H<J; I,J<P; P<Q.

The notation X<Y means that the activity X must be finished before Y can begin.

15 a A company has six jobs on hand coded A to F. All the jobs have to go through two machines Ml and M2. The time required for each job on each machine in hours is given below:

	A	B	C	D
Ml	3	12	18	9
M2	9	18	24	24

Draw a sequence table scheduling the six jobs on the two machines.

OR "

b Define (i) processing order (ii) processing time (iii) total elapsed time.

SECTION -C (40 Marks!
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 8 = 40)

16 a Use the graphical method to solve the following LPP

Maximize $z=2x_1+3x_2$

subject to the constraints $x_1+x_2<30$; $x_1-x_2>0$; $x_2>3$, $0<x_1<20$ and $0<x_2<12$.

OR

b A firm manufactures two products A and B on which the profits earned per unit are Rs.3 and Rs. 4 respectively. Each product is processed on two machines M] and M2

Product A remiires one mirmtp for nroppcsino timp nr Vf. arwt tu-n minntoe \/f_

/ a Given xn=50 units, XH=20 units, X2i=55 units, X3i=30 units, X32=35 units and X34=25 units. Is it an optimal solution to the transportation problem:

				Available units
6	1	9	3*	70
11	5	2	8	55
10	12	4	7	90

Required units   85   35   50   45

If not modify it to obtain a better feasible solution.

OR

b Solve the following assignment problem and find the minimum cost of making the assignment

	IV	V	VI
I	8	7	6"
II	5	7	8
III	6	8	7

18 a Solve the game whose pay off matrix is given by

	Bi	B_2	B_3
Aj	8	4	f
A_2	10	6	2
A_3	12	8	3
A_4	4	4	4

OR

Obtain the optimal strategies for both persons and the value of the game for zero sum two person game whose pay off matrix as follows:

1	-3
3	5
-1	6
4	1
2	2
-5	0

19 a Given the following data:

Activity:	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration (in days):	2	8	10	6	3	3	7	5	2	8

(i) Draw the arrow diagram.
(ii) Identify critical path and find the total project duration.
(iii) Determine, total, free and independent floats.

OR

b Define (i) Event float (ii) Activity float (iii) Critical path.

20 a Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed.

Job:	A	B	C	D	E	F	G
Mi:	3	8	7	4	9	8	7
M_2:	4	3	2	5	1	4	3
M_3:	6	7	5	11	5	6	12

OR

b Use graphical method to minimize the time added to process the following jobs on the machines shown i.e, for each machine find the job which should be done first. Also calculate the total time elapsed to complete both the jobs.

Job 1 { J Sequence   A   B   C   D   E

Job 1 { Time   3   4   2   6   2

Job 2 { Sequence   B   C   A   D   E

Job 2 { Time   5   4   3   2   6