UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2021

Course: Operation Research and Optimizations **Semester : V**
Program: B.Tech (CSE-BAO) **Duration : 03 hrs.**
Course Code: CSBA 3004 **Max. Marks: 100**

Instructions:

	SECTION A		
	(Scan and upload)	**(5Qx 4M = 20 Marks)**	
		Marks	COs
Q1	A computer center has four expert programmers (A, B, C, D) and needs to develop four application programs (1,2, 3,,4). The head of the computer center, estimates the computer time (in minutes) required by the respective experts to develop the application programs as follows:	4	CO3
Q2	What are the main elements of a queuing system?	4	CO4
Q3	Explain four important characteristics of operations research.	4	CO1
Q4	What do you mean by saddle point in game theory?	4	CO5
Q5	Explain the concept of ranked goals in goal programming briefly.	4	CO2

Table within Q1:

	A	B	C	D
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

Find the assignment pattern that minimizes the time required to develop the application programs.

	SECTION B		
	(Scan and upload)	**(4Qx10M = 40 Marks)**	
		Marks	COs
Q1	Use graphical method to: Maximize: $Z = 5x_1 + x_2$; subject to $x_1 + x_2 \le 10, 2x_1 + 3x_2 \ge 10$; $1, x_2 \ge 0$.	10	CO1
Q2	Use the Hungarian method to solve the following assignment problem:	10	CO3

	J_1	J_2	J_3	J_4
M_1	10	9	7	8
M_2	5	8	7	7
M_3	5	4	6	5
M_4	2	3	4	5

Q3	Solve the following game: Player A1 has value corresponding to Players B1 and B2 is 30, 2. Player A2 has value corresponding to Players B1 and B2 is 4, 14. Player A3 has value corresponding to Players B1 and B2 is 6, 9. Predict whether this game has saddle point or not. a. No saddle point exist b. Saddle point exist c. Saddle point exist with 10 value. d. Saddle point exist with 4 value.	10	CO4
Q4	What is inventory management? What are the basic principles of inventory management? OR What are the basic principles of queuing theory? Discuss about Simple two-equation queue.	4+6=10 5+5=10	CO4 CO4

SECTION C
(Scan and upload)   **(2Qx 20M = 40 Marks)**

Q1	What is random variable? Give some examples. What are discrete and continuous random variable? What is the main difference between these? Explain the usefulness of saddle point in game theory.	6+4+4+6 =20	CO5

Q2	What is feasible and infeasible solution? What is the usefulness of operations research in business?
	
	Solve the following problem and predict the solution:
	Max Z = -x1 + 2x2;
	Subject to
	x1-x2<=-1;
	-0.5x1+x2<=2;
	x1,x2>=0;
	a. Unbounded solution b. No feasible solution c. Unique optimal solution d. Multiple optimal solution
	
	OR
		6+6+8=20
		
		9+5+6=20
			CO2
			
			CO2

	Discuss the Knapsack problem. What are the basic methods for solving the problem? What is meant by linear programming and integer programming? Give an example.		