Name: **Enrolment No:**	

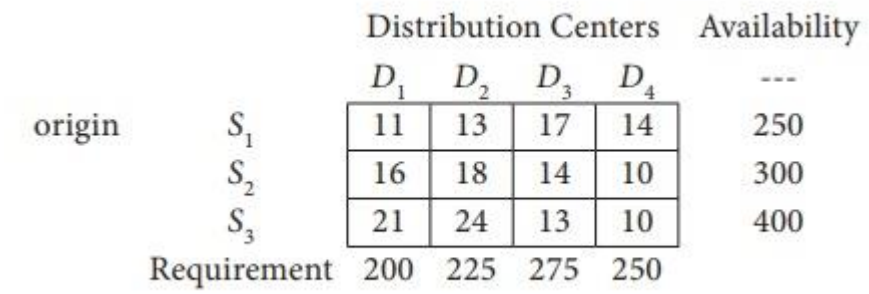
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Operation Research and Optimization **Semester: VI**
Program: B.Tech. - BAO **Time : 03 hrs.**
Course Code: CSBA 3004 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Why was operational research established in the first place?	**4**	**CO1**
Q2	Comment on the statement: "For implementation of operational research, a minimum work flow is required."	**4**	**CO3**
Q3	What are random variables?	**4**	**CO2**
Q4	How standard variance is different from variance?	**4**	**CO4**
Q5	What is Poisson distribution?	**4**	**CO1**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	Analyze the loss due to chances in later pay-roll phase while implementing operational research?	**10**	**CO4**
Q7	Analyze the use of probability distributions for random resource distribution?	**10**	**CO2**
Q8	Analyze the use of Markov model for the following situation: "You are expected to get an O based upon your grade in my subject in last sem." Assumptions: Only following grades exists: a. F b. C c. B d. A e. O Transition probabilities: F->C, C->B, B->A, A->O : 0.5 If your grade was O, start from B, If, it was A, start from B.	**10**	**CO3**

<table>
<tr><td>Q9</td><td>Explain the process of Developing a Model.
OR
Explain the Steps of LP problem formulation.</td><td>10</td><td>CO1</td></tr>
<tr><td colspan="4">SECTION-C
(2Qx20M=40 Marks)</td></tr>
<tr><td>Q10</td><td>Solve by Simplex method
Niki holds two part-time jobs, Job I and Job II. She never wants to work more than a total of 12 hours a week. She has determined that for every hour she works at Job I, she needs 2 hours of preparation time, and for every hour she works at Job II, she needs one hour of preparation time, and she cannot spend more than 16 hours for preparation. If she makes $40 an hour at Job I, and $30 an hour at Job II, how many hours should she work per week at each job to maximize her income?</td><td>20</td><td>CO1/CO 2</td></tr>
<tr><td>Q11</td><td>Solve the following by Vogel’s approximation method:
 

OR
The registration of a student at Universal Teacher Publications requires three steps to be completed sequentially. The time taken to perform each step follows an exponential distribution with mean 30/3 minutes and is independent of each other. Students arrive at the head office according to a Poisson input process with a mean rate of 25 per hour. Assuming that there is only one person for registration. On the basis of this information, find the following:
a. expected waiting time
b. expected numbers of students in the queue</td><td>20</td><td>CO4/CO 3</td></tr>
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