PAY-010-001510 Seat No. _____

B. B. A. (Sem. V) (CBCS) Examination

October / November - 2018

510 - Operation Research - 01

(New Course)

Faculty Code : 010

Subject Code : 001510

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Attempt all five questions.
(2) Each question carries equal marks.
(3) Figures to the right indicate marks.

1 (a) Explain Hungarian Assignment method. **7**

(b) A salesman has to visit four cities A, B, C and D. The distance (in km) between the four cities are as follows : **7**

		To City			
		A	B	C	D
From City	A	–	15	25	20
	B	22	–	45	55
	C	40	30	–	25
	D	20	26	38	–

If the salesman starts from city A and has to come back to city A, which route should be selected so that distance travelled is minimum ?

OR

1 A City Corporation has decided to carry out road repairs on four main arteries of the city. The government has agreed to make a special grant of Rs. 50 lakhs towards the costs with a condition warrant, then a supplementary token grant will also be considered favourably. The corporation has floated tenders and 5 contractors have sent in their bids. In order to expedite work, one road will be awarded to only one contractor. **14**

Road / Contractor	Cost of Repairs (Rs. in lakhs)			
	R_1	R_2	R_3	R_4
C_1	9	14	19	15
C_2	7	17	20	19
C_3	9	18	21	18
C_4	10	12	18	19
C_5	10	15	21	16

(1) Find the best way of assigning the repair work to the contractors and costs.

(2) If it is necessary to seek supplementary grants, then what should be the amount sought ?

(3) Which of the five contractors will be unsuccessful in his bid ?

2 (a) State similarities and dissimilarities of T.P. and A.P. **7**

(b) Obtain basic feasible solution of the following T.P. by **7**

(1) North-west corner rule

(2) Matrix minima method.

	W_1	W_2	W_3	W_4	Supply
F_1	11	6	15	3	16
F_2	7	8	4	13	18
F_3	22	17	8	31	24
Demand	11	15	17	15	58

OR

2 Solve the following T.P. for maximum profit **14**

Market / Warehouse	Per unit profit (Rs.)				
	A	B	C	D	Availability
x	12	18	6	25	200
y	8	7	10	18	500
z	14	3	11	20	300
Demand	180	320	100	400	

3 (a) What is L.P.P. ? State the characteristics of L.P.P. **7**

(b) Solve the following L.P.P. using Simplex Method. **7**

Maximize $Z = 10x_1 + 24x_2$

Subject to : $x_1 + 3x_2 \leq 20$

$x_1 + 2x_2 \leq 10$

$x_1, x_2 \geq 0$

OR

3 A firm is engaged in breeding pigs. The pigs are fed on various products grown in the firm. Because of the need to ensure certain nutrient constituents, it is necessary to buy additional one or two products called A and B. The nutrient constituent (vitamins and proteins) in each unit of the products are as follows. **14**

Nutrient	Nutrient contents in the product		Min nutrient amount
	A	B	
1	36	6	108
2	3	12	36
3	20	10	100

If product A and B cost Rs. 20 and Rs. 40 per unit respectively, how much of each of these two products should be bought so that total cost is minimized ? Solve graphically.

4 (a) State importance and characteristics of non-parametric test. **7**

(b) Explain the sign test for paired data. **7**

OR

4 Ankita's Boutique has three mall locations. Ankita keeps a daily record for each location of the number of customers who actually make a purchase. A sample of those data follows. Using Kruskal wallis test, can you say that her stores have the same number of customers who buy ? **14**

Mall A :	99	64	101	85	79	88	97	95	90	100
Mall B :	83	102	125	61	91	96	94	89	93	75
Mall C :	89	98	56	105	87	90	87	101	76	89

5	(a)	Discuss the concept and importance of Research.	**7**
	(b)	Explain sources of Secondary data.	**7**

OR

5	(a)	Define Research problems and discuss how to formulate the research hypothesis.	**7**
	(b)	Explain : Types of research.	**7**