

JK LakshmiPat University Jaipur
INSTITUTE OF ENGINEERING & TECHNOLOGY

Theory Examination-III (Regular), December 2022

B.Tech (CSE), Semester VII, 2022-2023

Roll No.....

Course Name: Operations Research

Time: 2 hours

Max. Marks: 30

Course Code : AS1201

Instructions to students:

1. Use of Cheat sheet is allowed having faculty signature.
2. Do not write anything other than your roll number on the question paper. All the best!!!!

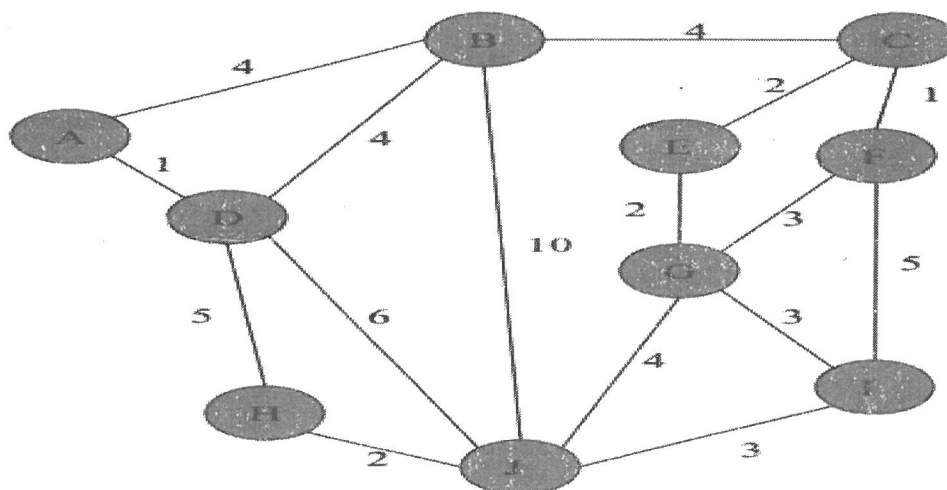
Q.1 Product Manufacturing Company (PMC) want to categorize inventory items as A, B and C classes according to their annual consumption value. Help, PMC to categorize the item give in below table 1:

Table 1: Data collection for the PMC products

No	Items	Annual Demand	Annual Percentage	Unit Price (RM)	Annual Cost (RM)	Annual Usage (%)	Annual Usage Cumulative (%)
1	Air Seri Gamat	1,600	1.80	10.00	16,000	1.33	1.33
2	Balsam Gamat	5,700	6.42	6.50	37,050	3.08	4.40
3	Balsam Halia	7,200	8.11	6.50	46,800	3.89	8.29
4	Balsam Serai	11,600	13.07	6.50	75,400	6.26	14.55
5	Balsam Seri Pala	5,200	5.86	6.50	33,800	2.81	17.36
6	Femi Herb II	455	0.51	21.90	9,965	0.83	18.18
7	Femi Herb Kapsul	319	0.36	21.90	6,986	0.58	18.76
8	Herba Munasir	1,554	1.75	21.90	34,033	2.83	21.59
9	Herba Perkasa	465	0.52	21.90	10,184	0.85	22.44
10	Herba Rangan	560	0.63	21.90	12,264	1.02	23.45
11	Herba Seri K. Fatimah	793	0.89	21.90	17,367	1.44	24.90
12	Herba Tongkat Ali	600	0.68	21.90	13,140	1.09	25.99

05
[LO3,
LO4,
LO6]

Q.2 Apply Kruskal's and Prim's algorithm for finding minimum spanning tree for the below graph



05
[LO1,
LO3,
LO6]

- Q.3 An R&D project has a list of tasks to be performed whose time estimates are given in the Table 2, as follows.

Table 2: Time estimation for R&D project

Activity i j	Activity Name	T_o	t_m (in days)	t_p
1-2	A	4	6	8
1-3	B	2	3	10
1-4	C	6	8	16
2-4	D	1	2	3
3-4	E	6	7	8
3-5	F	6	7	14
4-6	G	3	5	7
4-7	H	4	11	12
5-7	I	2	4	6
6-7	J	2	9	10

- Draw the project network.
- Find the critical path.
- Calculate EST, LST, EFT and LFT.

- Q.4 Evaluate the reliability of the system for which the reliability block diagram is shown in Fig. 1, for a mission of 100 hours. Assume that all components are independent and the reliability of each component is given for a mission of 100 hours as follows:

$R_1 = 0.80$, $R_2 = 0.75$, $R_3 = 0.50$, $R_4 = 0.65$, $R_5 = 0.76$, $R_6 = 0.60$, $R_7 = 0.95$, $R_8 = 0.90$, where R_i denotes the reliability of the component i , ($i = 1, 2, 3, \dots, 8$).

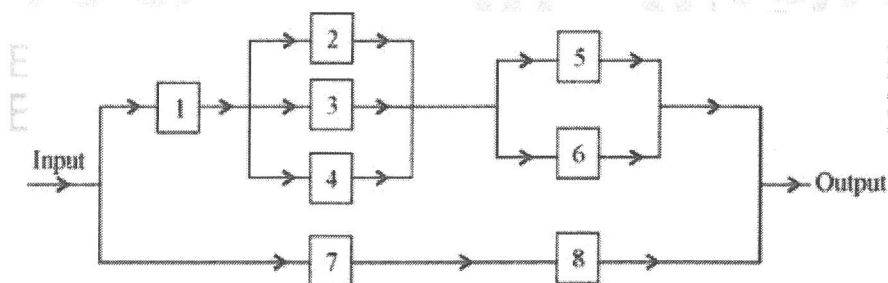


Fig. 1: Reliability block diagram

- Q.5 A cast iron bracket has a demand of 9000 units per year. The cost of one procurement is Rs. 100 and the holding cost per unit is Rs. 2.40 per year. The replacement is instantaneous and no shortage are allowed. Determine

- the economic lot size.
- the number of order per year.
- the time between the orders.
- minimum total variable cost.
- the total cost per year if Rs. 3 is the cost of one item.

Q.7	Construct the Bath-tub for software and hardware system. Let's say you have a very expensive piece of medical equipment that is responsible for taking important pictures of healthcare patients. Over the last year, it has broken down a total of five times. The time that each repair took was 3 hours, 6 hours, 4 hours, 5 hours and 7 hours respectively, making a total maintenance time of 25 hours. Calculate MTTR and justify its significance.	05 [LO5, LO6]
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