Model Question Paper (CBCS) with effect from 2015-16

15ME561

USN | | | | | | | | | | |

Fifth Semester B.E. Degree (CBCS) Examination

Optimization Techniques

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

		MODULE – I	
1	**a**	Define the following. (i) Design vector (ii) Design constraint (iii) Objective function (iv) Objective function surface	(08 Marks)
	b	Determine the maximum and mimum values for the function $f(x) = 6x^5 - 22.5x^4 + 20x^3 + 2.5$	(08 Marks)
		OR	
2	**a**	Define Optimization. What are the applications of optimization.	(08 Marks)
	b	Define the maxima and minima values for a given function with neat sketch.	(08 Marks)
		MODULE – II	
3	**a**	A manufacturer of wooden articles produces tables and chairs which requires two types of inputs mainly wood and labor. The manufacturer knows that for a table 3 units of wood and 1 unit of labor are required and for a chair 2 units are required. The profit from each table is Rs.20 while it is Rs.16 for each chair. The total available resources for manufacturer are 150 units of wood and 75 units of labor. The manufacturer wants to maximize his profit by distributing his resources for tables and chairs. Formulate the problem mathematically.	(08 Marks)
	b	Maximize $Z = 6x_1 + 7x_2$, subjected to constraints $2x_1 + 3x_2 \le 12$, $2x_1 + x_2 \le 8$ and $x_1, x_2 \ge 0$.	(08 Marks)
		OR	
4	**a**	A company has 3 operational departments (weaving, processing and packing) with capacity to produce 3 different types of clothes namely suiting, shirting and woolen yielding profits of Rs.200, Rs.400 and Rs.300 per meter respectively. One meter suiting requires 3min in weaving, 2min in processing and 1 min in packing. One meter shirting requires 4 min in weaving, 1 min in processing and 3 min in packing while one meter woolen requires 3 min in each department. In a week total run time of each department is 60, 40 and 80 hours respectively. Formulate the LPP to find the product mix to maximize the profit.	(08 Marks)
	b	Minimize $Z = 2x_1 + 3x_2$, subjected to constraints $x_1 + x_2 \le 4$, $6x_1 + 2x_2 \ge 8$, $x_1 + 5x_2 \ge 4$, $x_1, x_2 \le 3$ and $x_1, x_2 \ge 0$.	(08 Marks)
		MODULE – III	
5	**a**	For the given transportation matrix find the initial solution by least cost entry method and then find optimal solution D1 D2 D3 Supply O1 5 7 8 70 O2 4 4 6 30 O3 6 7 7 50 Requirement 65 42 43	(10 Marks)
	b	What are the characteristics of waiting lines	(06 Marks)
		OR	
6	**a**	A city corporation has decided to carry out road repairs on main four arteries of the city. The government has agreed to make a special grant of Rs.50 lakhs towards the cost with a condition that the repairs must be done at lowest cost and quickest time. If conditions warrant, then a supplementary token grant will also be considered favorable. The corporation has floated tenders and 5	(10 Marks)

<table>
<tr><td></td><td></td><td>contractors have sent in their bids. In order to expedite work, one road will be awarded to one contractor. (Amount in lakhs)

(a)Find the best way of assigning the repair works to the contractors and costs.
(b)Which of the 5 contractors will be unsuccessful in his bid?

<table>
<tr><td>Roads</td><td></td><td>R1</td><td>R2</td><td>R3</td><td>R4</td></tr>
<tr><td rowspan="5">Contractors</td><td>C1</td><td>9</td><td>14</td><td>19</td><td>15</td></tr>
<tr><td>C2</td><td>7</td><td>17</td><td>20</td><td>19</td></tr>
<tr><td>C3</td><td>9</td><td>18</td><td>21</td><td>18</td></tr>
<tr><td>C4</td><td>10</td><td>12</td><td>18</td><td>19</td></tr>
<tr><td>C5</td><td>10</td><td>15</td><td>21</td><td>16</td></tr>
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</td><td></td></tr>
<tr><td></td><td>b</td><td>Customer arrive at a single window drive in a bank according to Poisson distribution with a mean of 10 per hour. Service time per customer is exponential with a mean of 5 minutes. The space in front of the window including that for the serviced car can accommodate a maximum of cars. Others have to wait outside this space. (a) What is the probability that an arriving customer can drive directly to the space in front of the window? (b) What is the probability that an arriving customer will have to wait outside the indicated space? How long is an arriving customer expected to wait before starting service?</td><td>(06 Marks)</td></tr>
<tr><td></td><td></td><td><u>MODULE – IV</u></td><td></td></tr>
<tr><td>7</td><td>a</td><td>Use branch and bound technique to solve the following problem. Max. $Z=2x_1+2x_2$ subjected to $5x_1+3x_2\leq 8$, $x_1+2x_2\leq 4$. Both x_1 and x_2 are positive integers</td><td>(16 Marks)</td></tr>
<tr><td></td><td></td><td>OR</td><td></td></tr>
<tr><td>8</td><td>a</td><td>Write a short note on Zero-one programming</td><td>(08 Marks)</td></tr>
<tr><td></td><td>b</td><td>Write short notes on Gommory cutting plane method to find integer solution for LPP problems</td><td>(08 Marks)</td></tr>
<tr><td></td><td></td><td><u>MODULE – V</u></td><td></td></tr>
<tr><td>9</td><td>a</td><td>What is simulation? Mention the limitations of simulation.</td><td>(06 Marks)</td></tr>
<tr><td></td><td>b</td><td>Derive EOQ when stock replenishment is instantaneous.</td><td>(10 Marks)</td></tr>
<tr><td></td><td></td><td>OR</td><td></td></tr>
<tr><td>10</td><td>a</td><td>What is meant by inventory? Differentiate between dynamic and static inventory models.</td><td>(06 Marks)</td></tr>
<tr><td></td><td>b</td><td>Derive EOQ when stock replenishment is not instantaneous</td><td>(10 Marks)</td></tr>
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