

**Centre for Management Studies  
Dibrugarh University**

**Final 20XX**  
**Paper Code (Name): 20600 (QT)**  
**Max Marks: 60**

**Date: May 30, 20XX**  
**Course Instructor: HB**  
**Time: 165 minutes**

**For your Information!**

- There is step marking. So, your effort would be rewarded.
- Only the correct answer won't fetch you marks, the method and the process are also important.
- Think logically before answering / attempting any question.
- Refrain from adopting any unfair means
- **From each question, one sub question must be answered. Overall answer 60 marks worth of questions**
- **Pass Marks = 45 – Your Internal Assessment Marks**

**1.**

(a) In a town, 60% read magazine **A**, 25% do not read magazine **A** but read magazine **B**. Calculate the percentage of those who do not read any. Also find the percentage of those who read magazine **B**. **4**

(b) To control a certain crop disease, it is necessary to use 8 units of chemical **A**, 14 units of chemical **B** and 13 units of chemical **C**. One barrel of spray **P** contains one unit of **A**, 2 units of **B** and 3 units of **C**. One barrel of spray **Q** contains 2 units of **A**, 3 units of **B** and 2 units of **C**. One barrel of spray **R** contains one unit of **A**, 2 units of **B** and 23 units of **C**. How many barrels of each type of spray should be used to control the disease? **6**

(c) A company has examined its cost structure and revenue structure and has determined that **C**, the total cost, **R**, the total revenue and **x**, the number of units produced are related as:  $C = 100 + 0.015x^2$  and  $R = 3x$ . Find the production rate **x** that will maximize profits of the company and that profit. **6**

(d) A company suffers a loss of ₹ 1000 if its product does not sell at all. Marginal Revenue and Marginal Cost functions for the product are given by  $MR = 50 - 4x$ ,  $MC = -10 + x$ . Determine the Total Profit function, breakeven points and the profit maximizing level of output. **6**

(e) If  $u = x^2 + y^2 + z^2$ , prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 2u$  **3**

**2.**

(a) A box contains 10 pens. Out of these 10 pens, 8 pens are good and 2 pens are defective. If two pens are selected at random from the box without replacement, then what is the probability that both the selected pens are defective? Also compute the probability of selecting one good and one defective pen. **3 + 2 = 5**

(b) A manufacturing firm has 300 machines. The probability that any one of them will not function during the day is 0.01. What is the probability that *exactly* five machines will be out of order on the same day? Use Poisson distribution. **4**

(c) Jyoti Travellers determined that the distance traveled per bus on an annual basis is normally distributed with a mean of 40000 km and standard deviation of 10000 km. Calculate what proportion of buses may be expected to travel 25000 to 35000 km in a year. Given that  $P(z = 1.5) = 0.4332$  and  $P(z = 0.5) = 0.1915$ . **5**

**3.**

(a) The lighting segment is composed of GLS lamps, fluorescent tubes and CFLs. The organized market contributes 60% to the total sales of GLS lamps. A leading national GLS lamps company believes that this market size has increased due to various factors. For verifying this claim, the company's research officer has taken a random sample of 200 GLS lamps purchasers. Out of 200 GLS lamp purchasers, 145 purchasers have purchased from the organized market. At 95% confidence level, test the belief of the company. *Critical value of z = 1.96* **6**

(b) Give a brief on non-sampling errors. **4**

4.

(a) A restaurant produces fresh burgers for its customers every day. The company is known for supplying fresh burgers and never uses burgers prepared on the previous day. Demand (number of customers) for burgers is uncertain, preparation capacity is limited, and the restaurant has the option of producing 0, 1000, 2000, 3000 or 4000 burgers every day. It has been estimated that the cost of producing each burger is ₹ 10. Each burger is sold for ₹ 20. Prepare a pay-off matrix when 0, 1000, 2000, 3000 or 4000 customers turn up on any given day. Find out the optimal act using the *Hurwicz* and *Regret* criterion. **10**

5.

(a) Solve the following game

		<i>Player B</i>		
		B1	B2	B3
<i>Player A</i>	A1	3	-2	4
	A2	-1	4	2
	A3	2	2	6

**7**

(b) A company produces two types of leather belts **A** and **B**. **A** is of superior quality and **B** is of inferior quality. The respective profits are ₹ 10 and ₹ 5 per belt. The supply of raw material is sufficient for making 850 belts per day. For belt **A**, a special type of buckle is required and 500 are available per day. There are 700 buckles available for belt **B** per day. Belt **B** needs half as much time as that required for Belt **A** and the company can produce 500 belts if all of them are of the type **A**. Formulate and solve the LPP problem. **10**

(c) A product is produced by four factories F1, F2, F3 and F4. Production capacity of the factories is 50, 70, 40 and 50 units respectively. The product is supplied to four stores S1, S2, S3 and S4, the requirements of which are 25, 35, 105 and 45 respectively. Unit costs of transportation are given below:

	<b>S1</b>	<b>S2</b>	<b>S3</b>	<b>S4</b>
<b>F1</b>	2	4	6	11
<b>F2</b>	10	8	7	5
<b>F3</b>	13	3	9	12
<b>F4</b>	4	6	8	3

Find an initial optimal shipping schedule using the NWC, Least Cost and VAM methods and select the best one. **10**

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**ALL THE BEST**

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