

Roll No.

Total No. of Questions – 7

Total No. of Printed Pages – 12

Time Allowed – 3 Hours

Maximum Marks – 100

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Answer to questions are to be given only in English except in the case of candidates who have opted for Hindi Medium. If a candidate has not opted for Hindi medium, his answers in Hindi will not be valued.

Question No. 1 is compulsory.

Answer any **five** out of the remaining **six** questions.

Working Notes should form part of the answer.

No Statistical or other table will be distributed along with this paper.

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1. (a) If Moonlite Limited operates its plant at normal capacity it produces 2,00,000 units from the plant 'Meghdoot'. The unit cost of manufacturing at normal capacity is as under : 5

	₹
Direct material	65
Direct labour	30
Variable overhead	33
Fixed overhead	7
	135

Direct labour cost represents the compensation to highly-skilled workers, who are permanent employees of the company. The company cannot afford to lose them. One labour hour is required to complete one unit of the product.

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The company sells its product for ₹ 200 per unit with variable selling expenses of ₹ 16 per unit. The company estimates that due to economic down turn, it will not be able to operate the plant at the normal capacity, at least during the next year. It is evaluating the feasibility of shutting down the plant temporarily for one year.

If it shuts down the plant, the fixed manufacturing overhead will be reduced to ₹ 1,25,000. The overhead costs are incurred at a uniform rate throughout the year. It is also estimated that the additional cost of shutting down will be ₹ 50,000 and the cost of re-opening will be ₹ 1,00,000.

Required :

Calculate the minimum level of production at which it will be economically beneficial to continue to operate the plant next year if 50% of the labour hours can be utilized in another activity, which is expected to contribute at the rate of ₹ 40 per labour hour. The additional activity will relate to a job which will be off-loaded by a sister company only if the company decides to shut down the plant.

(Assume that the cost structure will remain unchanged next year. Ignore income tax and time value of money.)

- (b) An investor is interested in investing ₹ 15,00,000 in a portfolio of investments. The investment choices and expected rates of return on each one of them are : **5**

Investment	Projected Rate of Return
Mutual Fund 'XY'	15%
Mutual Fund 'HN'	9%
Money Market Fund	8%
Government Bonds	8.75%
Share 'P'	17%
Share 'Q'	18%

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The investor wants at least 40% of his investment in Government Bonds. Because of the higher perceived risk of the two shares, he has specified that the combined investment in these two shares not to exceed ₹ 2.60.000. The investor has also specified that at least 25% of the investment should be in the money market fund and that the amount of money invested in shares should not exceed the amount invested in Mutual Funds. His final investment condition is that the amount invested in mutual fund 'XY' should be no more than the amount invested in mutual fund 'MN'. The problem is to decide the amount of money to invest in each alternative so as to obtain the highest annual total return.

Required :

Formulate the above as a linear programming problem.

- (c) PQR Limited sells two versions : Deluxe and Premium of its only product GoGo Juicer. The GoGo Juicer uses patented technology to extract the last drop of juice from most fruits. The 'Premium' version can handle larger fruit and has more options relative to the 'Deluxe' version. The following table provides the financial results of the most recent year of operations :

Particulars	Deluxe 90,000 units	Premium 10,000 units	Total 1,00,000 units
Revenue (₹)	63,00,000	9,00,000	72,00,000
Material cost (₹)	10,80,000	2,50,000	13,30,000
Direct labour cost (₹)	14,40,000	1,60,000	16,00,000
Contribution margin (₹)	37,80,000	4,90,000	42,70,000
Allocated fixed manufacturing overheads (₹)	34,20,000	3,80,000	38,00,000
Allocated fixed selling and administrative overheads (₹)	2,51,563	35,937	2,87,500
Profit margin (₹)	1,08,437	74,063	1,82,500
Profit margin per unit (₹)	1.2048	7.4063	

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Labour cost is ₹ 16 per hour and each product requires one hour of labour. The company currently allocates all fixed manufacturing overheads, using labour hours as the allocation basis. It allocates fixed selling and administrative overheads, using revenue is the allocation base.

Although the profit margin per unit of 'Deluxe' juicer is rather low, PQR Limited believes that it is important to keep this model in the product mix. However, PQR can tailor its promotion and sales strategies to improve the sales mix to 16 : 4 ratio from the current 9 : 1 ratio of 'Deluxe' to 'Premium' juicers, with total volume staying at 1,00,000 units.

PQR Limited finds that ₹ 1.1 million of the ₹ 3.8 million of fixed manufacturing overheads pertains to batch related activities such as scheduling production runs. Similarly, ₹ 1,15,000 is the amount of administrative overheads out of the ₹ 2,87,500 of selling and administrative overheads.

It is found that the 'premium' juicer is produced in smaller batches (250 units per batch) than that of 'Deluxe' juicer (500 units per batch). Similarly, it takes 10 sales visits to sell 1,000 units of the 'Deluxe' juicer, while it takes 25 visits to sell 1,000 units of 'Premium' juicer.

Required :

- (i) Prepare a profitability statement based on the proposed sales mix, using the most appropriate basis of allocating fixed overheads.

(In absence of an appropriate basis, do not allocate overheads to products)

- (ii) Advise the company on whether it should go ahead with the propose change in sales mix.

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2. (a) PEX is a manufacturing company of which division PQR manufactures a single standardized product. Some of the output is sold externally whilst the remainder is transferred to division RPQ where it is a subassembly in the manufacture of that division's product. PQR has the capacity (annual) to produce 30,000 units of the product. The unit costs of division PQR's product are as under :

	₹
Direct material	40
Direct labour	20
Direct expenses	20
Variable manufacturing overheads	20
Fixed manufacturing overheads	40
Sells and packaging expenses – variable	10
	150

Annually 20,000 units of the product are sold externally at the standard price of ₹ 300 per unit.

In addition to the external sales, 10,000 units are transferred annually to division RPQ at an internal transfer price of ₹ 290 per unit. This transfer price is obtained by deducting variable selling and packing expenses from the external price since those expenses are not incurred for internal transfers.

Division RPQ incorporates the transferred-in goods into a more advanced product. The unit costs of this product are as follows :

	₹
Transferred-in-item (from division PQR)	290
Direct material and components	230
Direct labour	30
Variable overheads	120
Fixed overheads	120
Selling and packing expenses – variable	10
	800

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Division RPQ's manager disagrees with the basis used to set the transfer price. He argues that the transfers should be made at variable cost plus an agreed (minimal) mark up because his division is taking output that division PQR would be unable to sell at the price of ₹ 300.

Partly because of this disagreement, a study of the relationship between selling price and demand has recently been carried out for each division by the company's sales director. The study has brought out the following demand schedule :

Division PQR

Selling price (₹)	200	300	400
Demand (units)	30,000	20,000	10,000

Division RPQ

Selling price (₹)	800	900	1,000
Demand (units)	14,400	10,000	5,600

The manager of the division RPQ claims that this study supports his case. He suggests that a transfer price of ₹ 120 would give division PQR a reasonable contribution to its fixed overheads while allowing division RPQ to earn a reasonable profit. He also believes that it would lead to an increase of output and an improvement in the overall level of company profits.

Required :

- (i) Calculate the effect of the transfer price of ₹ 290 per unit on company's operating profit. Calculate the optimal product mix.
 - (ii) Advise the company on whether the transfer price should be revised to ₹ 120 per unit.
- (b) Explain the term 'Degeneracy' in the context of a transportation problem. **5**
How can this be solved ?

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3. (a) Sunglow Limited manufactures and sells a single product. From the records of the company the following information is available for November 2012 : 9

The standard cost comprises the following :

Direct material	Unit	₹
X	8	320
Y	24	1,680
Z	16	400
		2,400
Direct wages (₹ 40 per hour)		1,600
Variable overhead (25% of direct wages)		400
Fixed overhead (based on budgeted production of 10,000 units of the final product per month)		600
		<u>5,000</u>

The budgeted selling price is ₹ 700 each and the budgeted sales for the month were 14,000 units.

The following were the transactions for the month :

Direct material	Units	Purchased priced per unit	Issued unit
X	44,000	42	82,400
Y	1,40,000	71	2,46,400
Z	60,000	24	1,64,000

Direct Wages : ₹ 90,00,000 (3,98,000 hours)

Overheads :

Variable ₹ 2,00,000

Fixed ₹ 3,00,000

Production : 11,000 Units

Sales : 9,000 units at ₹ 700 each and 3,500 units at ₹ 750 each

Required :

Calculate (i) Material price variance; (ii) Material mix variance; (iii) Labour rate variance (iv) Labour efficiency variance (v) Variable overhead efficiency variance; and (vi) Fixed overhead efficiency variance.

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- (b) An international tourist company deals with numerous personal callers each day and prides itself on its level of service. The time to deal with each caller depends on the client's requirements which range from, say, a request for a brochure to booking a round-the-world cruise. If a client has to wait for more than 10 minutes for attention, it is company's policy for the manager to see him personally and to give him a holiday voucher worth ₹ 15. 7

The company's observations have shown that the time taken to deal with clients and the arrival pattern of their calls follow the following distribution pattern :

Time to deal with clients	Minutes	2	4	6	10	14	20	30
		0.05	0.10	0.15	0.30	0.25	0.10	0.05
Time between call arrivals	Minutes	1	8	15	25			
		0.2	0.4	0.3	0.1			

Required :

- Describe how you would simulate the operation of the travel agency based on the use of random number tables;
- Simulate the arrival and serving of 12 clients and show the number of clients who receive a voucher (use line 1 of the random numbers below to derive the arrival pattern and line 2 for serving times); and
- Calculate the weekly cost of vouchers, assuming the proportion of clients receiving vouchers derived from (ii) applies throughout a week of 75 operating hours.

Random Numbers

Line 1	03	47	43	73	86	36	96	47	36	61	46	98
Line 2	63	71	62	33	26	16	80	45	60	11	14	10

4. (a) A production supervisor is considering how he should assign five jobs that are to be performed to five operators. He wants to assign the jobs to the operators in such a manner that the aggregate costs to perform the job is the least. He has the following information about the wages paid to the operators for performing these jobs. 8

Operators	Jobs				
	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

Required :

Assign the jobs to the operators so that the aggregate cost is the least.

- (b) Discuss the characteristics of zero base budgeting. 4
- (c) Discuss the essential requisites for installation of uniform costing system. 4
5. (a) The Board of Directors of XY Company Limited are considering a new type of handy sewing machine which their R & D Department has developed. The expenditure so far on research has been ₹ 95,000 and a consultant's report has been prepared at a cost of ₹ 22,500. The report provides the following information : 12

Cost of production per unit :

	₹
Material	45.00
Labour	75.00
Fixed overheads	20.00
(Based on Company's normal allocation rates)	
	140.00

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Anticipated additional fixed costs :

Rent for additional space ₹ 1,25,000 per annum

Other additional fixed costs ₹ 70,000 per annum

A new machine will be built with the available facilities with a cost of ₹ 1,10,000 (material ₹ 90,000 and labour ₹ 20,000). The materials are readily available in stores which are regularly used. However, these are to be replenished immediately. The price of these materials have since been increased by 50%. Scrap value of the machine at the end of the 10th year is estimated at ₹ 20,000. The product scraps generated can be disposed off at the end of year 10 for a price of ₹ 1,43,000.

Years 1 – 5		Years 6 – 10	
Demand (Unit)	Probability	Demand	Probability
40,000	0.15	24,000	0.30
20,000	0.60	16,000	0.50
12,000	0.25	4,000	0.20

It is estimated that the commercial life of the machine will be no longer than 10 years and the after tax cost of capital is 10%. The full cost of the machine will be depreciated on straight line basis, which is allowed for computing the taxable income, over a period of 10 years. Tax rate is 30%.

DCF factors at 10%:-

1 – 5 years (cumulative)	3.79
6 – 10 years (cumulative)	2.355
10 th year	0.386

Required :

Compute minimum selling price for the handy sewing machine.

- (b) What are the distinctive features of learning curve theory in manufacturing environment ? Explain the learning curve ratio.

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6. (a) XY Hotel has 40 bed rooms with a maximum occupancy of 490 sleeper nights per week. Average occupancy is 60% throughout the year. Meals provided to guests have been costed and the average food cost per person per day is as follows :

	₹
Breakfast	72.00
Lunch	220.00
Dinner	268.00
	560.00

Direct wages and staff meals per week are as under :

	₹
Housekeeping	39,040.00
Restaurant and kitchen	68,600.00
General	35,200.00

Direct expenses per annum are ₹ 9,15,200 for house keeping and ₹ 10,40,000 for restaurant. Indirect expenses amount to ₹ 68,22,400, which should be apportioned on the basis of floor area. The floor areas are as follows :

	Sq. Mt.
Bed rooms	3,600
Restaurant	1,200
Service area	<u>600</u>

A net profit of 10% must be made on the restaurant taking and also on accommodation takings.

Required :

Calculate what inclusive term per person should be charged per day and also show the split between meals and accommodation charges.

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- (b) In the context of Activity Based Costing System, explain the following statement : 4

“Strategic cost analysis should exploit internal linkages.”

- (c) Write a short note on the distinction between PERT and CPM. 5

7. Answer any **four** of the following questions :

- (a) What is target costing ? It is said that target costing fosters team work within the organisation. Explain how target costing creates an environment in which team work fosters. 4

- (b) What qualitative factors should be considered in an decision to outsource manufacturing of a product ? 4

- (c) “Sunk cost is irrelevant in decision making, but all irrelevant costs are not sunk costs.” Explain with examples. 4

- (d) Write a short note on the characteristics of the dual problem. 4

- (e) Brief the principles associated with synchronous manufacturing. 4

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