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MCA  
MGT 3001

First Semester Examination, 2003

ENGINEERING ECONOMICS AND COSTING

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 which is compulsory and any five from the remaining questions

*The figures in the right-hand margin indicate marks*

1. Answer the following questions: 2 × 10

(i) Calculate the effective interest rate for a nominal interest rate of 18% compounded semi-annually.

(ii) Deduce the relation

$$A = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

where  $A$  is fixed annual payment;  $i$  is the annual interest rate;  $n$  is the number of years the annual payment is made, and  $P$  is the present value.

(iii) Define the concept of Internal Rate of Return.

(Turn Over)

(iv) Distinguish between deterioration and obsolescence of an asset.

(v) State and explain any two of the methods of evaluation of investment proposals.

(vi) Discuss the concepts of trade discounts, quantity discounts and cash discounts.

(vii) Distinguish between cost allocation and cost apportionment.

(viii) What do you mean by prime cost, production cost (factory cost) and total cost?

(ix) Suppose that the figures for opening stock of the materials, purchase of the materials during a year and closing stock are available. How would you estimate inventory turnover?

(x) Classify costs according to their functions and explain each of them.

2. (a) Explain the principle of Equivalence with illustration.

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(b) Laser beams are to be used on a major construction project to assure the exact alignment of components. Two types of laser alignment systems, with the costs shown below, are suitable for the project:

	IC System	UC System
First cost	\$ 5000	\$ 3,200
Salvage value	1,000	0
Annual operating cost	600	950
Additional taxes and insurance	180	0

(i) If both systems have a life of 4 years and the minimum rate of return is 15 per cent, which offers the lower equivalent annual cost?

(ii) How much longer would the economic life of the IC system have to be in order to make the equivalent annual costs of the two system equal?

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3. In the design of certain industrial facilities, two alternative structures are under construction—Plan A and Plan B. The receipts from the sale of goods and services will not be affected by the choice between the two plans. Which plan would you recommend, given the following information on these two plans?

	Plan A	Plan B
First cost (Rs.)	50,000	1,20,000
Life (yrs.)	20	40
Salvage value (Rs.)	10,000	20,000
Annual O and M disbursement (Rs.)	9,000	6,000
Extra annual disbursement (Rs.)	—	1,250

Minimum attractive rate of return is 11%. Use the present worth method to arrive at the decision.

4. Engineering Models, Inc., usually keeps its company fleet cars for 5 years before replacement. Since discounted autos purchased exactly 2 years ago have deteriorated much more rapidly than expected, management wonders what is more economical: replace the cars this year with new autos; retain the cars for 1 more

year and then replace them; retain for 2 more years then replace; or keep them for 3 more years until the end of their estimated lives. Perform a replacement analysis at  $i = 20\%$  using the estimated costs given below:

Currently-owned car (Defender)	Possible Replacement (Challenger)
Value at Beginning of year	Annual operating cost
Next year (3)	\$ 3800
Next year (4)	\$ 2800
Last year (5)	\$ 500
Remaining life	3
Salvage value after 3 more years	\$ 500
	First cost \$ 8700
	Annual cost \$ 3900
	Life (per year) 5 years
	Salvage value \$ 1800

5. (a) Define Inventory. State the primary and secondary reasons for carrying inventories.



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(b) A company has annual demand of 1,50,000 units for a material. The ordering cost per order is Rs.40 and cost of carrying inventory per unit is 20% of the item cost, which is Rs.0.15. The current order quantity is 40,000 units.

(i) Determine the optimal order quantity.

(ii) What is the percent of variation of the order quantity from the optimal, and

(iii) What is the percent of variation of the total cost from the cost associated with optimal order quantity? 3+2+2

6. (a) Discuss the usefulness of variance analysis to the management. 3

(b) The standard mix for each batch of 100 units of a product is

Mat A	6 kg	at Rs. 15	90
Mat B	4 kg	at Rs. 10	40
	<u>10 kg</u>		<u>130</u>

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During January, 10 batches were completed with actual consumption as follows:

Mat A	63 kg	at Rs. 14	882
Mat B	39 kg	at Rs. 11	429
	<u>102 kg</u>		<u>1311</u>

Actual output was 960 units.

Calculate material variances. 7

7. (a) Define the concepts of Marginal Cost and Marginal Costing. 3

(b) From the following information in respect of a semi-variable expense (e.g., maintenance cost) obtain the fixed and variable elements and find the probable amount of the semi-variable expense for the month of July, when the volume of production would be 60 units, using the least squares method. 7

Month	Production (units)	Semi-variable expenses (Rs.)
January	90	130
February	120	150
March	100	135
April	130	160
May	115	145
June	95	125

8. (a) Distinguish between job costing and process costing methods of cost finding. 4

(b) Prepare a table showing the methods of costing to be used for the following items:

Furniture, pharmaceuticals, chemicals, motor cars, books, ship building, paints, road construction, confectionery, oil refinery and radio sets. 6

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