SPRING END SEMESTER EXAMINATION-2018

4th Semester B.Tech & B.Tech Dual Degree

ENGINEERING ECONOMICS

HS-2002

[For 2017(L.E.), 2016 & Previous Admitted Batches]

Time: 3 Hours | Full Marks: 60

Answer any SIX questions including question No.1 which is compulsory.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. (a) The individual demand functions of three customers are given below: [2×10]

$Q_1 = 10 - P$

$Q_2 = 20 - 1.5P$

$Q_3 = 40 - 2.5P$

where Q_1, Q_2 and Q_3 are demand of three customers and P stands for price. Find the market demand function. What will be the market demand when P is ₹ 10?

(b) What will happen to the equilibrium price if there is a rightward shift in the supply curve of the market, the demand function remaining unchanged?

(c) Draw an Iso-quant taking two factors, labour (L) and capital (K) when Marginal Rate of Technical Substitution ($MRTS_{LK}$) is constant.

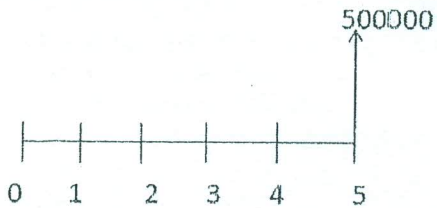
(d) A firm's Total Cost (TC) function is given by the equation

$$TC=4000+5Q+10Q^2$$

(i) What is the Average Fixed Cost (AFC) when output (Q) is 400 units?

(ii) Write an expression for Marginal Cost (MC).

(e) Find the sinking fund amount of the following cash flow diagram at the rate of interest 8% compounding yearly.



i=8%

(f) A loan of $10000 is made today at an interest rate of 15% annual compounding and the first repayment of $3000 is made at the end of 4 years. What is the amount still due on the loan after the first payment is made?

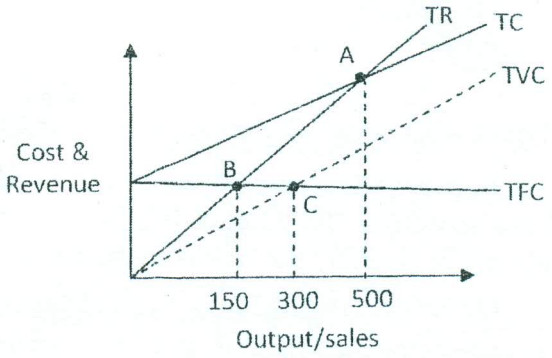
(g) Find the effective rate of interest for 12 months if the nominal rate of interest is 1% per month and the compounding occurs monthly. Using this effective rate of interest find the compound amount at the end of 10 years for an amount of ₹ 100000 which is invested now.

(h) Projects x, y and z have costs of 260, 360 and 300 millions respectively. If the equivalent benefits and costs ratios are 1.4, 1.7, 1.9 respectively, then from the economic consideration which projects you will select and why?

(i) The demand equation for the product is given as P = 50-0.5Q (P is price and Q is quantity).

Find the price elasticity of demand when Total Revenue (TR) is maximum.

(j) From the following figure find the point when the firm faces neither profit nor loss.



If the actual sales of the firm are 700 units what is the Margin of Safety (MOS) of the firm is percentage? What is your interpretation of this safety margin?

2. (a) The following table gives information about the market for two models of cars. [4]

Models	No. of cars sold per week	Cross elasticity of demand with respect to the price of petrol
1200 cc	10000	-0.25
2000 cc	5000	-0.50

If the price of car remains unchanged and the price of petrol increases by 100%, what will be the effect on the number of cars sold per week?

(b) There are two goods X_1 and Y_1 on which you are spending your entire monthly income of \$1000. The utility function is $U = X_1^{1/2} Y_1^{1/2}$, (U stands for Total Utility). Find out the optimal quantities of X_1 and Y_1 for maximizing your satisfaction. Your budget constraint is $1000=10X_1+4Y_1$. [4]

(b) The initial outlay on a project is ₹40000 with a salvage value of ₹10000. The net benefits from the project are given in the following table. Find the Net Present Value (NPV) of the project at the opportunity cost of the project as 10% annual compounding. [4]

Year	1	2	3	4	5	6	7	8	9	10
Net benefits (₹)	7000	9000	10000	11000	9500	7600	5700	4000	2000	2000

6. (a) Two Plans are considered for a section of an water passage. Plan A uses a tunnel and Plan B uses a lined canal and steel flume. The life period of both the plans is 20 years. The interest rate is 8% compounded annually. [4]

Particulars	Plan A	Plan B
First cost	₹450000	₹300000
Annual O&M cost	₹5000	₹10000
Salvage value	₹80000	₹90000
Life (years)	20	20

Compare the two plans on the basis of the equivalent annual cost and select the better plan.

(b) The initial cost of a machine is ₹400000 with an estimated salvage value of ₹40000 at the end of the life of 8 years. Tabulate the annual depreciation charge and book value of the machine by declining balance method at the end of each year. The depreciation rate is $\frac{2}{N}$ (N is the life period of the asset) [4]

7. (a) Bhubaneswar city needs to build a new bypass between two major roads in Smart city project that will cut travel time and distance for commuters. The road will cost ₹28,000,000 and will save ₹200 per person, per year for 17,500 people. The road needs maintenance every year at a cost of ₹200000. The road is expected to be used for 20 years after which it needs resurfacing. Determine if Bhubaneswar city should build the road by B/C ratio method. The cost of money is 8% yearly compounding (Use Present Worth Analysis). [4]

(b) Find the IRR of the following cash flows of a project by Hit and Trial method and state whether the project should be accepted if the company requires a minimum return of 20 percent. [4]

Time period	0	1	2	3	4
Cash Flows($)	16000	4800	5640	7500	4600

8. (a) Explain the following instruments for controlling inflation. [4]
(i) Bank rate
(ii) Open market operation

(b) You have agreed to make investment in your friends agricultural farm. This would require an amount of $20,000 as initial investment on your part. Your friend promises you revenue (before expenses) of $3600 per year the first year and thereafter the revenue increases by $200 per year. Your share of the estimated annual expenses is $1000. You are planning to invest for six years. Your friend has made the commitment to buyout your share of the business at that time for $24000. You have decided to set a personal MARR of 15% per year. Judge the profitability of the investment project by using Future Worth (FW) method. [4]

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