SPRING END SEMESTER EXAMINATION-2024

EVALUATION SHEME

SUBJECT - ENGINEERING ECONOMICS

CODE - 30101

Time: 2 Hours 30 Minutes **Full Marks: 50**

Answer any FIVE questions.
Question paper consists of two SECTIONS i.e. A and B.
Section A is compulsory.
Attempt any Four question from Sections B.
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.

<table>
<tr><th colspan="4">SECTION-A (Learning levels 1)</th><th>Learning levels as per Bloom's taxonomy</th><th>Course Outcomes (CO)</th></tr>
<tr><td>1.</td><td></td><td>Answer the following questions.</td><td>[1 10]</td><td></td><td></td></tr>
<tr><td></td><td>(a)</td><td>What do you mean by price effect?
ANS: Student will have to write the definition of price effect and have to draw its diagram.
Or
Student can write as per the discussion in their respective classes.</td><td></td><td>Remember & understanding</td><td>CO1</td></tr>
<tr><td></td><td>(b)</td><td>Distinguish between relatively inelastic demand and perfectly inelastic demand.
ANS: Student will have to write the definitions of relatively elastic and perfectly inelastic demand and have to draw their respective diagrams with examples.</td><td></td><td>Remembering & understanding</td><td>CO1</td></tr>
<tr><td></td><td>(c)</td><td>From the following table find out $MRTS_{LK}$ and $MRTS_{LK}$.
<table><tr><th>Combination</th><th>Units of Labour Used(L)</th><th>Units of Capital Used(K)</th></tr><tr><td>A</td><td>1</td><td>20</td></tr><tr><td>B</td><td>2</td><td>15</td></tr><tr><td>C</td><td>3</td><td>11</td></tr><tr><td>D</td><td>4</td><td>8</td></tr><tr><td>E</td><td>5</td><td>6</td></tr></table></td><td></td><td>Remembering, understanding and applying</td><td>CO2</td></tr>
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		<table><tr><th>Combination</th><th>Units of Labour Used(L)</th><th>Units of Capital Used(K)</th><th>$MRTS_{LK}$</th><th>$MRTS_{LK}$</th></tr><tr><td>A</td><td>1</td><td>20</td><td>-</td><td>-</td></tr><tr><td>B</td><td>2</td><td>15</td><td>5</td><td>1/5</td></tr><tr><td>C</td><td>3</td><td>11</td><td>4</td><td>1/4</td></tr><tr><td>D</td><td>4</td><td>8</td><td>3</td><td>1/3</td></tr><tr><td>E</td><td>5</td><td>6</td><td>2</td><td>1/2</td></tr></table>			
	(d)	Explain the relationship between total cost (TC) and marginal cost (MC). ANS: Students will have to write the definitions of TC and MC, their respective formulae.		Remembering, understanding and applying	CO2
	(e)	A company charges 25% interest rate on its credit amount. Find out the effective interest rate if the compounding is monthly. ANS: $i_{ff} = (1 + r/m)^m - 1 = (1 + 0.25/12)^{12} - 1 = 28.073\%$		Remembering, applying and evaluating	CO3
	(f)	A company takes a loan of ₹ 70,00,000 at 11% interest rate compounded annually. Find out the installment amount that the company has to pay if the number of compounding is 25. ANS: $A = P\ [i(1+i)^n / (1+i)^n–1] = 70,00,000\ [0.11(1+0.11)^{25} / (1+0.11)^{25} -1] = 831181.694$		Remembering, applying and evaluating	CO3 &CO4
	(g)	An instrument has been purchased at ₹ 80,00,000 with estimated salvage value of ₹ 20,000 at the end of its service life of 10 years. Find out the rate of depreciation and book value of the instrument after 5 years with the help of straight-line method of depreciation. ANS: D = 80,00,000-20,000 / = 10 = 7,98,000 d = D/I x 100 = 7,98,000 / 80,00,000 x 100 = 9.975% B_5 = I – (t X D) = 80,00,000 – (5x 7,98,000) = 40,10,000		Remembering, applying and evaluating	CO3 & CO4
	(h)	Write down the annual worth criterion. ANS: If NAW > 0, project will be selected If NAW = 0, project may or may not be selected If NAW < 0, project will be rejected		Remembering, applying and analyzing	CO4 & CO5
	(i)	What do you mean by Net Present Value (NPV)? ANS: It refers to the sum of all the present values from a future stream of benefits during the life span		Remembering, applying and analyzing	CO4 and CO5

		of a project. Or As per the discussion in their respective classes.			
	(j)	How bank rate will help to control inflation of an economy? ANS: How increase in the bank rate help in controlling inflation student will have to explain.		Analyzing and creating	CO6
		SECTION-B (Learning levels 2, 3, 4, 5 and 6)		Learning levels as per Bloom's taxonomy	Course Outcomes (CO)
2.	(a)	Define income effect. How it is different from price effect? ANS: Students will have to write the definition of income effect and price effect. Then students have to draw and explain their respective diagrams.	[5]	Remembering & understanding	CO1
	(b)	A company has the following sales in different years. Forecast sales for the year 2010 and 2012.	[5]	Applying, analyzing and evaluating	CO2 & CO3

Year	2003	2004	2005	2006	2007	2008	2009
Sales (in $000)	15	25	30	45	50	55	62

Year	Sales (in $000)	x	xy	x^2
2003	15	-3	-45	9
2004	25	-2	-50	4
2005	30	-1	-30	1
2006	45	0	0	0
2007	50	1	50	1
2008	55	2	110	4
2009	62	3	186	9
N = 7	$\Sigma y = 282$	$\Sigma x = 0$	$\Sigma xy = 221$	$\Sigma x^2 = 28$

$\Sigma y = Na + b\Sigma x \Rightarrow 282 = 7a \Rightarrow 40.285$

$\Sigma xy = a\Sigma x + b\Sigma x^2 \Rightarrow 221 = 28b \Rightarrow b = 7.892$

$y = a + bx$

$\Rightarrow y = 40.285 + 7.892x$

$y_{2010} = 40.285 + 7.892(4) = 71.853$

$y_{2012} = 40.285 + 7.892(6) = 87.637$

3.	(a)	Explain the output maximization and cost minimization case of producer's equilibrium with the help of suitable	[5]	Applying and	CO2 & CO3

		diagrams. ANS: First students will have to write the condition for producer's equilibrium. Then they have to draw and explain the diagrams of output maximization and cost minimization.		analyzing	
	(b)	A company has the following total cost (TC) function: $TC = 100 + 5Q + Q^2$ Find: (i) Total Fixed Cost (TFC) (ii) Average cost (AC) function (iii) marginal cost (MC) function (iv) The level of output at which AC will be minimum (v) The level of output at which MC will be minimum ANS: (i) 100 (ii) AC = TC/Q = 100/Q + 5 + Q (iii) MC = d(TC)/dQ = 5 + 2Q (iv) For AC to be minimum d(AC)/dQ = 0 => Q = 0 (v) For MC to be minimum d(MC)/dQ = 0 Student should get grace mark in Q. No. 3. (b) (iv) and (v) as some mistake is there in the question.	[5]	Applying and evaluating	CO2 & CO3
4.	(a)	A company has to choose a best project out of alternative available projects. Find out the best project on the basis of present worth method if i = 16% compounded annually.	[5]	Applying, evaluating and analyzing	CO4 &CO5

Particulars	Project A	Project B
Initial cost (₹)	50,00,000	65,00,000
Life of the project (in years)	17	17
Annual revenue (₹)	3,00,000	5,00,000
Salvage value (₹)	3000	5000

ANS: NPW = - **P + A[(1+i)^{17} -1/i(1+i)^{17}] + S[1/(1+i)^{17}]**

NPW$_A$ = - 50,00,000 + 3,00,000**[(1+0.16)^{17} -1/0.16(1+0.16)^{17}] + 3000[1/(1+0.16)^{17}] = - 32,75,147.794**

NPW$_B$ = **-65,00,000 + 5,00,000[(1+0.16)^{17} -1/0.16(1+0.16)^{17}] + 5000[1/(1+0.16)^{17}] = - 36,25,246.324**

Project A will be selected as annual revenue from project A will be more than that of B.

(b) A company wants to purchase a machine. There are two machines available in the market. Find out which machine the company should select on the basis of future worth method if i= 18% compounded annually.

Particulars	Machine 1	Machine 2
Initial cost (₹)	20,00,000	15,00,000
Life of the project (in years)	20	20
Annual operation and maintenance cost (₹)	1,00,000	1,50,000

ANS: NFW= P(1 + i)^n + C**[(1+i)^{20} -1/i] -S**

NFW$_1$ = 20,00,000(1 + 0.18)^{20} + 1,00,000[(1+0.18)^{20} - 1/0.18]

= 6,94,48,866.210747

NFW$_2$ = 15,00,000(1 + 0.18)^{20} + 1,50,000[(1+0.18)^{20} - 1/0.18]

= 6,30,83,747.409

Machine 2 will be selected as cost of Machine 2 is less than that of 1.

[5] Applying, evaluating and analyzing CO4 &CO5

5. (a) Project A and B are the two mutually exclusive projects which are being considered for investment. The initial cost of project A is ₹ 35,00,000 with annual return of ₹ 8,50,000 for the next 10 years. The initial cost of project B is ₹ 40,00,000 with annual return of ₹ 9,00,000 for the next 12 years. Both the projects have no salvage value. Find out which project will be selected on the basis of benefit-cost analysis if the interest rate is 10% compounded annually.

[5] Applying, evaluating and analyzing CO4 &CO5

ANS: PW(C)$_A$ = 35,00,000

PW(B)$_A$ = 8,50,000 [(1 + 0.1)^{10} - 1 / 0.1(1 + 0.1)^{10}] = 52,22,882.039

(B / C)$_A$ = [PW(B) / PW(C)]$_A$ = 52,22,882.039/35,00,000 = 1.49

PW(C)$_B$ = 40,00,000

PW(B)$_B$ = 9,00,000 [(1 + 0.1)^{12} - 1 / 0.1(1 + 0.1)^{12}] = 6132322.642

(B / C)$_B$ = [PW(B) / PW(C)]$_B$ = 6132322.642/40,00,000 = 1.53

		Project B will be selected as B/C ratio of project B is more than that of A.			
	(b)	The purchased price of a machine is ₹ 2,00,000. Find out the depreciation amount and book value of the machine for 5 years with the help of declining balance method of depreciation if the rate of depreciation is 25%. ANS: $D_t = K \times B_{t-1}$ $B_t = B_{t-1} - D_t$	[5]	Applying, evaluating and analyzing	CO4 &CO5

Years	D_t	B_t
0	---	2,00,000
1	50,000	1,50,000
2	37,500	1,12,500
3	28,125	84,375
4	21,093.75	63,281.25
5	15,820.3125	47,460.9375

6.	(a)	Explain any five causes of inflation. ANS: Students have to explain any five causes of inflation. Or As per the discussion in their respective classes.	[5]	Analyzing and creating	CO6
	(b)	Explain fiscal policy of the Government for controlling inflation. ANS: Students have to explain the instruments of fiscal policy to control inflation. Or As per the discussion in their respective classes	[5]	Analyzing and creating	CO6
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