

## V - SEMESTER

B.Tech

END TERM EXAMINATION Nov/Dec-2022

HU 301 - ENGINEERING ECONOMICS

Time: 03:00 Hours

Max. Marks: 50

Note: Attempt any five questions. All questions carry equal marks.
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Q.1 (a) A consumer consumes only two goods X&Y both priced at 3 per unit. If the consumer chooses a combination of these two goods with the marginal rate of substitution equal to 3. Is the consumer in equilibrium? Give reasons. What will a rational consumer do in this situation? [CO:1][5 Marks]

(b) What do you mean by Production Function? Explain the likely behaviour of Output when all the inputs are increased in the production process. [CO:1,2][5 Marks]

Q.2 (a) How are commercial banks different from the Central Bank? Discuss the mechanism of credit creation by commercial banks. [CO:2][5 Marks]

(b) What causes the fluctuations in the Economic output over a period of time. Discuss phases of the business cycle. [CO:2,3][5 Marks]

Q.3 (a) Investment A costs Rs.10,000 today and pays back Rs.11,500 two years from now. Investment B costs Rs.8000 today and pays back Rs.4500 each year for two years. If an interest rate of 5 % is used, which alternative is superior? [CO:4] [5Marks]

(b) A company can make a particular component or purchase from the market. The cost detail is as below:

If it purchases from the market.	Rs.3050+GST @18%
The purchasing price per unit	
If it makes:	
Cost of the machine	Rs 1020300+GST @18%

Salary of the machine operator per month	Rs 30000
Rent of the workshop per month	Rs 25000
Raw material-1 per unit	Rs 400+GST@18%
Raw material -2 per unit	Rs 1100 +GST @18%
Other cost per unit	Rs 300

If the annual demand is 1500

Whether company should 'Make' or 'purchase'. Suggest  
[CO:2,4] [5 Marks]

- Q.4 (a) A monopolist has the cost function  $TC(y) = 200y + 15y^2$  and faces the demand function given by  $p = 1200 - 10y$ . On the basis of given information, calculate the following: [CO:1,4][5 Marks]

- What output maximizes its profit?
- What is the profit-maximizing price?
- What is its maximal profit?

- (b) Discuss the guiding principles of Indian Five Year Plans.  
[CO:3][5 Marks]

- Q.5 (a) A person is planning for his retired life. He has 10 more years of service. He would like to deposit 20% of his salary which is 4000 at the end of the first year and thereafter he wishes to deposit the amount with an annual increase of Rs 500 for the next 9 years with an interest rate of 15%. Find the total amount at the end of the 10th year of the above series.  
[CO:4][5 Marks]

- (b) What do you mean by Fiscal policy? How can Fiscal Policy be used to close an Inflationary and Recessionary gap? [CO:2,3][5 Marks]

- Q.6 (a) A company invests in one of the two mutually exclusive alternatives. The life of both alternatives is estimated to be 5 years with the following investments, annual returns and salvage value.

	Alternatives	
	A	B
Investment (Rs)	-1,50,000	-1,75,000
Annual equal return (Rs)	+ 60,000	+70,000
Salvage value (Rs)	+15,000	+35,000

Determine the best alternative based on the annual equivalent method if  $i = 25\%$   
[CO:4] [5 Marks]

- (b) Discuss the major trade barriers imposed by countries to restrict trade.  
[CO:2,3] [5 Marks]

Q.7 (a) A company is planning to expand its business after 10 years. To meet the expansion expenditure, at the end of first year the company is planning to deposit Rs. 20,00,000 in the reserve and from the next year it will increase the amount to be deposited Rs. 15,000 from the previous deposit for the next 9 years with an interest rate of 12%. Calculate the total amount which the company will have for the expansion at the end of 10 years.  
[CO:4] [5 Marks]

- (b) From the following information calculate the break- even point and the turnover (sales) required to earn a profit of Rs 36000.

Fixed overheads	Rs. 18000
Variable cost per unit	Rs. 2
Selling price	Rs. 20

If the company is earning a profit of Rs. 36000 express the margin of safety level.  
[CO:4][5 Marks]

$$F = P (1+r)^t$$

$$A = F \left( \frac{r}{(r+1)^t - 1} \right)$$

$$A = P \left( \frac{r (1+r)^t}{(r+1)^t - 1} \right)$$

$$A = A_1 \pm \frac{G}{r} \left[ \frac{(r+1)^t - 1 - rt}{(r+1)^t - 1} \right]$$



1) a)  $P_x = 3$  ,  $P_y = 3$

$$MRS_{xy} = 3 \quad \text{--- ①}$$

$$MRS_{xy} = P_x / P_y = 3/3 = 1 \quad \text{--- ②}$$

As, ①  $\neq$  ②, consumer will not be in equilibrium.

AtQ,  $MRS_{xy} > P_x / P_y$ , it means that to obtain one more unit of x, the consumer is willing to sacrifice more units of y as compared to what is required in the market. It includes the consumer to buy more of x.

As a result, MRS falls and continue to fall until it becomes equal to the ratio of prices and the equilibrium is established.

3) a)

Investment A

$P = -10\,000$

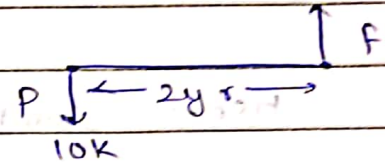
$F = 11\,500$

$t = 2 \text{ yrs}$

$r = 5\% = 0.05$

$$PW = -10\,000 + 11\,500 \times \frac{1}{(1+r)^t} = -10\,000 + \frac{11\,500}{(1.05)^2}$$

$$= ₹ 430.839\,002$$

Investment B

$P = -8000$

$A = 4500$

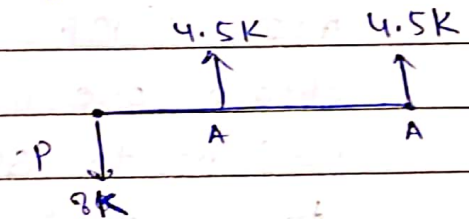
$t = 2 \text{ yrs}$

$r = 5\% = 0.05$

$$PW = -8000 + 4500 \left[ \frac{(1+r)^t - 1}{(1+r)^t \times r} \right] = -8000 + 4500 \left[ \frac{1.05^2 - 1}{1.05^2 \times 0.05} \right]$$

$$= -8000 + 4500 (1.8594104)$$

$$= ₹ 367.34694$$



Investment A is more profitable.

3) b)

Purchase

$$\text{Total purchase price} = 1500 \times [3050 + 0.18 \times 3050]$$

$$= 53,98,500$$

make

$$\text{Cost of machine} = (10\,20\,300 + 0.18 \times 10\,20\,300)$$

$$= 12,03,954$$

$$\text{Total salary} = 30\,000 \times 12 = 360,000$$

$$\text{Total rent} = 25\,000 \times 12 = 300,000$$

$$\text{Total other cost} = 300 \times 1500 = 450,000$$



$$\text{Total cost for Raw material - 1} = [400 + 0.18 \times 400] \times 1500 \\ = 708000$$

$$\text{Total cost for Raw material - 2} = [1100 + 0.18 \times 1100] \times 1500 \\ = 1947000$$

$$\text{Total make cost} = ₹ 49,68,954$$

Hence company should make.

$$4) a) \quad T.R. = p \times y = 1200y - 10y^2$$

$$MC = MR \Rightarrow 1200 - 20y = 200 + 30y \Rightarrow y = 20 \quad \text{Output}$$

$$\text{price} = 1200 - 10 \times 20 = ₹ 1000$$

$$\begin{aligned} \text{Profit} = TR - TC &= 1200y - 10y^2 - 200y - 15y^2 \\ &= 1000y - 25y^2 = ₹ 10,000 \end{aligned}$$

$$\frac{d^2(\text{profit})}{dy^2} = -50 < 0 \quad \text{Hence maximum.}$$

5) a)  $t = 10$  yrs  $20\% \text{ Salary} = \frac{20}{100} \times 4000 = 800$

$A_1 = ₹ 800$

$G = 500$

$r = 15\% = 0.15$

$F = ?$

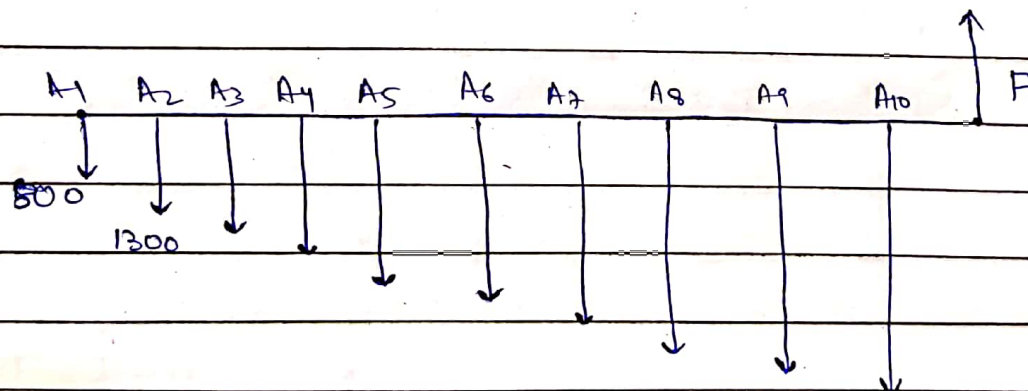
$$A = A_1 + \frac{G}{r} \left[ \frac{(r+1)^t - 1 - rt}{(r+1)^t - 1} \right]$$

$$= 800 + \frac{500}{0.15} \left[ \frac{1.15^{10} - 1 - 1.5}{1.15^{10} - 1} \right]$$

$A = 2491.597916$

$$F = A \left( \frac{(r+1)^t - 1}{r} \right) = A \left( \frac{1.15^{10} - 1}{0.15} \right)$$

$= ₹ 50,588.702049$





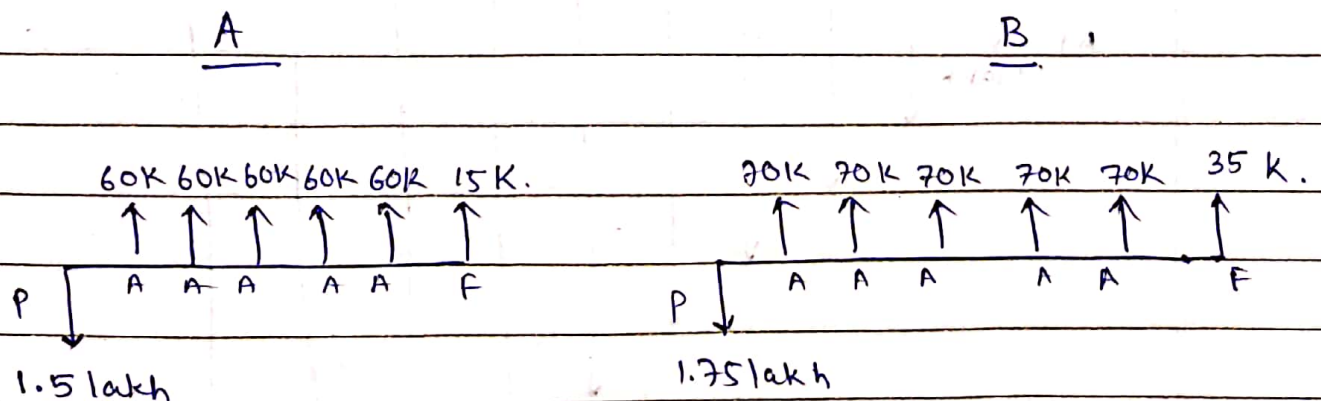
6) a)  $t = 5$  yrs  $r = 25\% = 0.25$   
 $F = \text{Salvage}$   $A = \text{Annual return}$   $P = \text{Investment}$   
Alternative A

$$\begin{aligned}
 AW &= 60000 + F \left( \frac{r}{(1+r)^t - 1} \right) - P \left( \frac{r(1+r)^t}{(1+r)^t - 1} \right) \\
 &= 60000 + 15000 \left( \frac{0.25}{1.25^5 - 1} \right) - 150000 \left( \frac{0.25 \times 1.25^5}{1.25^5 - 1} \right) \\
 &= 60000 + 15000(0.121847) - 150000(0.371847) \\
 &= ₹ 6050.655
 \end{aligned}$$

Alternative B

$$\begin{aligned}
 AW &= 70000 + 35000 \left( \frac{r}{(1+r)^t - 1} \right) - P \left( \frac{r(1+r)^t}{(1+r)^t - 1} \right) \\
 &= 70000 + 35000(0.121847) - 175000(0.371847) \\
 &= ₹ 9191.42
 \end{aligned}$$

Clearly Alternative B is more profitable.



7) a)  $t = 10 \text{ yrs}$   $A_1 = 20,00,000$   
 $G_1 = +15000$   $r = 12\% = 0.12$   
 $F = ?$

$$A = A_1 + \frac{G_1}{r} \left[ \frac{(r+1)^t - 1 - rt}{(r+1)^t - 1} \right]$$

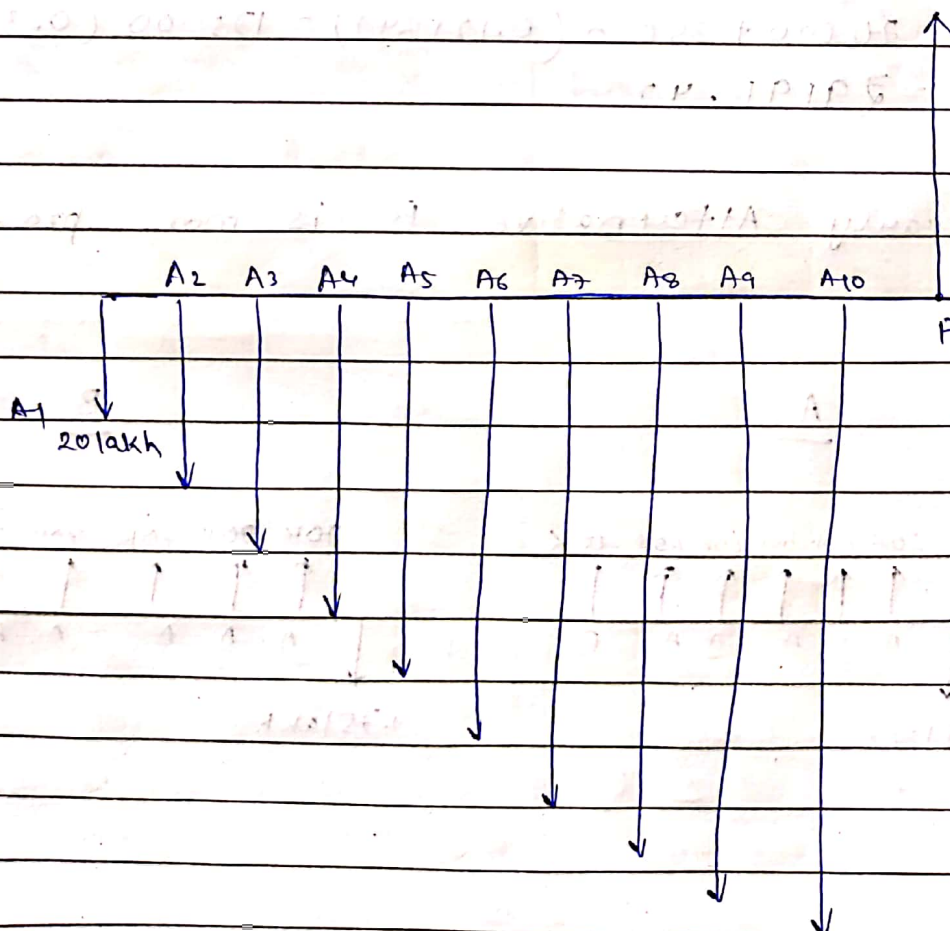
$$= 20,00,000 + \frac{15000}{0.12} \left[ \frac{1.12^{10} - 1 - 1.2}{1.12^{10} - 1} \right]$$

$$A = 20,53,769.7948$$

$$F = A \left( \frac{(r+1)^t - 1}{r} \right)$$

$$= A \left( \frac{1.12^{10} - 1}{0.12} \right) = A \times (17.548736)$$

$$F = ₹ 3,60,41,062.03$$





7/b) BEP = ? Sales ? Margin of safety ?  
Let  $x$  be the quantity.

Profit = 36000 Selling price = 20 VC/unit = 2  
Fixed overheads = 18000

$$\begin{aligned}\text{Profit} &= \text{Contribution} - \text{Fixed Cost} \\ &= \text{Sales} - (\text{Fixed} + \text{Variable}) \\ 36000 &= 20x - (18000 + 2x)\end{aligned}$$

$$54000 = 18x \Rightarrow x = 3000 \text{ units.}$$

$$\checkmark \text{ Sales} = 20x = ₹60,000$$

$$\text{Contribution} = \text{Sales} - \text{V.C.}$$

$$= 60000 - (2 \times 3000) = ₹54,000$$

$$\text{PV ratio} = \frac{\text{Contri.}}{\text{Sales}} \times 100 = \frac{54000}{60000} \times 100 = 90\%$$

$$\checkmark \text{ BEP} = \frac{\text{F.C.}}{\text{PV}} = \frac{18000}{90} \times 100 = ₹20,000$$

$$\checkmark \text{ Margin of Safety} = \frac{\text{Profit}}{\text{PV}} = \frac{36000}{90} \times 100$$

$$= ₹40,000$$