

DEPARTMENT OF HUMANITIES & MANAGEMENT V SEMESTER B.TECH. (COMMON TO ALL BRANCHES) END SEMESTER EXAMINATIONS, DEC 2021

Engineering Economics & Financial Management (HUM 3051)

#### (Date: 18-12-2021 Time: 9:00 AM - 12:00 PM)

### Time: 3 Hours

#### MAX. MARKS: 50

## **Instructions to Candidates:**

- Answer **ALL** the questions.
- ✤ Any data not provided may be suitably assumed.

Q.	Question	Μ	CLO	AHEP4	BL
No				LO	
1	If the initial investment of machine is Rs.10,000, annual operating cost is	1	4	M1,M	4
	Rs.2,500 and salvage value is Rs.1,500, then which among the following			2,M3	
	rate of 12%?				
	a) Capital Recovery with return is given by (10000+1500)				
	(A/P,12%,5)+1500*0.12				
	b) Annual Worth is given by (10000-1500) (A/P,12%,5)+1500*0.12+2500				
	c) Annual worth is given by 10000(A/P,12%, 5)+2500-1500(A/F,12%,5)				
	d) Capital recovery with return is given by 10000(A/P,12%,5)-				
	1500(A/F,12%,5)				
2	Mr. X deposits Rs.500 into an account one year from now, which pays an	1	4	M1,M	4
	interest at the rate of 12% per year compounded quarterly. He later increases			2 1 1 2	
	the deposit amount by Rs.100 for the next five years. Which among the			2,1013	
	following equations DOES NOT represent the translation to calculate the PW				
	of the cash flows?				
	a) [500+100(A/G,12.55%,6)](P/A,12.55%,6)				
	b) [500+100(A/G,12.55%,6)](F/A,12.55%,6)(P/F,12.55%,6)				
	c) 500(P/F,12.55%,1)+600(P/F,12.55%,2)+700(P/F,12.55%,3)+800(P/F,12.55%				
	,4)+9 00(P/F,12.55%,5)+1000(P/F,12.55%,6)				
	d) [500+100(A/G,12.55%,6)](P/A,12.55%,5)				
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3	The for	mula to calculate the amount to be deposited into a trust account	1	1	M1,M	2
	today t	o enable the trust to maintain a historical monument by spending			2	
	Rs.300	,000 once in every three years is: (Assume interest rate as 12% per			-	
	annum	)				
	a)	3 00 000/0 12				
	a) b)	[3 00 000(A/F 12% 3)] /0 12				
	(C)	3 00 000(P/F 12% 3)				
	(9 d)	Summation of all the three				
						-
4	Econor	nic service life results in	1	1	M1,M	1
					2	
	a)	a) Minimum equivalent annual cost				
	b) Maximum equivalent annual cost					
	c)	Both the options				
	d)	None of the above				
5	lf an eal.		1	1	M1 M	1
5	II mark	et value is less than the book value, it amounts to:	-	-		-
	a)	Capital gain			2	
	с) b)	Opportunity cost				
	5)					
	C)	Sunk cost				
	d)	Salvage value				
6	lf you c	lecide the keep the old machine by not selling, then the market value	1	1	M1,M	1
	becom	es:			2	
	a)	Capital gain				
	b)	Opportunity cost				
	c)	Sunk cost				
	d)	Salvage value				
	,	-				



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7	Four different machines a process. An engineer per but some of his calculation all machines is 10 years, N	ar different machines are under consideration for improving a certain production cess. An engineer performed an economic analysis to select the best machin some of his calculations were MISSING in the report as shown below. The life machines is 10 years, MARR = 11%						M1,M 2,M3	4
		Cash	flows in 000's						
	Machine	1	2	3	4				
	First Cost	Α	-65	-72	-98				
	Annual cost	-70	-64	-61	-58				
	Annual Savings	+80	+80	+80	+82				
	Overall ROR(IRR)	18.6%	В	23.1%	20.8%				
	Machine's compared		2 to 1	3 to 2	4 to 3				
	Incremental Investment16 C -26								
	Incremental cash flows - +6 E D (ie., Net income) per year								
	Incremental ROR - 35.7% 22.72% 14 to 15 %								
	The value of A is- a) -44 b) -49 c) 49 d) 44								
8	The value of B is neares	st to:				1	4	M1,M	4
	a) 20% b) 21% c) 23%							2,M3	
	u) 24%								
9	The value of C is:					1	4	M1,M	4
	a) -7 b) -12 c) -15 d) -10							2,M3	
10	The value of D is:					1	4	M1,M	4
	a) 5 b) 2 c) -2 d) 10							2,M3	
11	The value of E is:					1	4	M1,M	4
	1. 0							2,M3	
	2. +6								
	3. +3								
	40								

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12	The IRR	for an infinite cash	n flow series give	en below is:	1	4	M1,M	4
		6 I F	<u>,                                     </u>				2,M3	
	Year	Cash Flow						
	0	-\$15,459						
	1	3,000						
	2	3,000						
	-	:						
	a) <b>515</b> 0	/						
	a) 515% b) 17.83	° 3%						
	c) 15%	570						
	d) 19.42	1%						
13	A company	is considering insta	alling a new proces	ss system. Following two vendors	1	4	M1,M	4
	nave subm	itted their proposal	s on the system. v	which vehaor is preferred?			2,M3	
	Vear (	a) Vendor A	Vendor B	Vendor B – Vendor A				
		\$500.000	\$600.000	\$100,000				
	1 - 15	48 170	-\$000,000	17 710				
	IRR	5%	7%	15 73%				
	IIII	570	//0	15.7570				
	a) Ve	endor B is preferre	ed as long as the	company's MARR is less than				
	79	%.						
	b) Ve	endor B is preferre	ed as long as the	e company's MARR is less than				
	ec	qual to 15.73%						
	c) Ve	endor A is preferre	ed if the company	y's MARR is greater than 15.73%.				
	d) Ve	endor A is preferre	ed as long as the	e company's MARR is less than				
	59	%.						
14	You are m	aking quarterly de	eposits of \$1,000	) into an account at 12% per	1	4	M1,M	3
	annum. If	you want to keep	the account for 1	10 years, how much money will be			2 M3	
	there in yo	our account at the	end of 10 years'	? (Assume 30 days per month) if			2,113	
	the bank p	pays 12% interest,	compounded m	<i>nonthly,</i> the future worth at the				
	tenth yea	r would be:						
	a) F=	= 1000(F/A, 3.03%	, 10)					
	b) F=	=1000(F/A, 3.03%,	40)					
	c) F=	=1000(F/A, 3.03%,	120)					
	d) F=	=1000(F/A, 3.03%,	30)					
					1			

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15	You are making quarterly deposits of \$1,000 into an account at 12% per	1	4	M1,M	3
	annum. If you want to keep the account for 10 years, how much money will be			2 142	
	there in your account at the end of 10 years? (Assume 30 days per month) If			2,1015	
	the bank pays 12% interest, compounded <i>daily</i> , the future worth at the tenth				
	year would be:				
	a) F= 1000(F/A, 3.045%, 40)				
	b) F= 1000(F/A, 3.045%, 365)				
	c) F=1000(F/A, 3.045%, 10)				
	d) $E=1000(E/A_3.045\%, 120)$				
16	You are making quarterly deposits of \$1,000 into an account at 12% per	1	4	M1,M	3
	annum. If you want to keep the account for 10 years, how much money will be			,	
	there in your account at the end of 10 years? (Assume 30 days per month)If			2,M3	
	the bank pays 12% interest, compounded <i>quarterly</i> , the future worth at the				
	tenth year would be:				
	a) F=1000(F/A, 4%, 40)				
	b) $F=1000(F/A - 3\% - 10)$				
	r = 1000(1/1, 5)(, 10)				
	C) F=1000(F/A, 3%, 40)				
	d) F=1000(F/A, 4%, 10)				
47	If the bank never 100/ interest, compounded weekly the future worth at the	_			
17	In the bank pays 12% interest, compounded weekly, the future worth at the	1	4	M1,M	3
				2,M3	
	a) F=1000 (F/A, 3.042%, 40)				
	b) F=1000(F/A, 3.042%, 52)				
	c) $F=1000(F/A 3.042\% 10)$				
	d) $E = 1000(E/A + 3.042\% + 120)$				
	uj 1 = 1000(17A, 3.04270, 120)				
18	A set of recurring and non-recurring costs are as follows: An investment of	1	4	M1.M	3
_	Rs. 10.00.000 in the beginning of the year, a recurring maintenance cost of			,	_
	Rs. 10,000, an estimated additional investment of Rs. 50,000 at the end of $5^{\text{th}}$			2,M3	
	vear will be made. In addition, there is an additional renovation cost of Rs				
	50,000 once in every 5 years. If the interest rate is 10% per year, the				
	capitalized cost for the project can be equated as:				
	a) 1.000.000 + 10.000/i + 50.000 (P/F. 10%, 5) + 50.000 (A/F. 10%, 5)/0.1				
	b) (1,000,000 + 10,000/i + 50,000 (P/F, 10%, 4) + 50,000 (A/F, 10%, 5) /0.1)				
	* 0.1				
	c) 1,000,000/0.1 + 10,000 (P/A, i, 5) + 50,000 (P/F, 10%, 4) + 50,000 (A/F,				
	10%, 5) /0.1				
	d) $1,000,000 + 10,000$ (P/A, i, 5) + 50,000 (P/F, 10%, 4) + 50,000 (F/A, 10%,				
	ə) /U. I				
19	An investment of Rs. 10,00,000 in the beginning of the year, a recurring	1	4	M1.M	3
	maintenance cost of Rs. 10.000, an estimated additional investment of Rs.	-		,	5
	50,000 at the end of 5 <sup>th</sup> year will be made. In addition there is an additional			2,M3	
	renovation cost of Rs. 50,000 once in every 5 years. If the interest rate is 10%				

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20	<ul> <li>per year, the <i>equivalent annual cost</i> of the capitalized cost project can be equated as:</li> <li>a) (1,000,000 + 10,000/i + 50,000 (P/F, 10%, 5) + 50,000 (A/F, 10%, 5)/0.1) *0.1</li> <li>b) (1,000,000 + 10,000/i + 50,000 (P/F, 10%, 4) + 50,000 (A/F, 10%, 5) /0.1) * 0.1</li> <li>c) 1,000,000/0.1 + 10,000 (A/P, i, 5) + 50,000 (P/F, 10%, 4) + 50,000 (A/F, 10%, 5) /0.1</li> <li>d) 1,000,000 + 10,000 (A/P, i, 5) + 50,000 (P/F, 10%, 4) + 50,000 (F/A, 10%, 5) /0.1</li> <li>You borrowed \$1,000 at 8%, compounded annually. The loan was repaid</li> </ul>	1	4	M1,M	4
	according to the following schedule.	-		2,M3	
	be a) \$108 b) \$345 c) \$460 d) \$298				
21	Specify whether the following sentences are true or false The present worth method of comparing alternatives involves converting all cash flows to present dollars at the MARR. Capital recovery cost analysis is an extension of PW analysis performed for systems that have relatively long lives and a large percentage of their lifetime costs in the form of operating expenses. a) True, True b) False, False c) True, False d) False, True	1	1	M1,M 2	1
22	A company has bought a truck 3 years ago at a cost of Rs.15,00,000 with an expected life of ten years. Its current market value is estimated to be around Rs.8,00,000. The estimated salvage value at the end of ten years is Rs. 75,000. The company adopts Declining balance method of depreciation for maintaining its books of account. What will be the undepreciated value of the truck now? a) Rs.6,10,304 b) Rs.5,10,304 c) Rs,8,00,000 d) Rs.6,89,900	1	2	M1,M 3,M5	3

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23	A company has bought a truck 3 years ago at a cost of Rs.15,00,000 with an expected life of ten years. Its current market value is estimated to be around Rs. 8,00,000. The estimated salvage value at the end of ten years is Rs. 75,000. The company adopts Declining balance method of depreciation for maintaining its books of account. What will be the sunk cost/capital gain of the truck if the company decides to sell the truck now? a) -1,89,697 b) Zero c) 7,00,000 d) None of the options listed	1	2	M1,M 3,M5	4
24	A company has bought a truck 3 years ago at a cost of Rs.15,00,000 with an expected life of ten years. Its current market value is estimated to be around Rs. 8,00,000. The estimated salvage value at the end of ten years is Rs. 75,000. The company adopts Declining balance method of depreciation for maintaining its books of account. What will be the depreciation charge for the seventh year? a) Rs.3,88,383 b) Rs.4,00,383 c) Rs.2,50,665 d) None of the above	1	2	M1,M 3,M5	4
25	A person needs to plan his investment for his retirement life. He expects that he needs Rs 5, 00, 000 per year for a duration of 15 years after retirement. He is now 40 years old and plans to retire at 60 years. He wants to start the savings with a deposit of Rs.1, 00, 000 now. At an interest rate of 7%, he wants to find additional uniform amount that he needs to deposit on yearly basis till he retires. The equal amount is given by a) X= $[5,00,000 (P/A, 7\%, 15) -1,00,000 (F/P, 7\%, 20)] / (F/A, 7\%, 20)$ b) X= $[5,00,000 (F/A, 7\%, 20) -1,00,000 (F/P, 7\%, 20)] / (F/A, 7\%, 15)$ c) X= $[5,00,000 (P/A, 7\%, 15) -1,00,000 (P/F, 7\%, 20)] / (F/A, 7\%, 20)$ d) X= $[5,00,000 (P/A, 7\%, 35) -1,00,000 (F/A, 7\%, 20)] / (F/A, 7\%, 20)$	1	1	M1, M2	3
26	<ul> <li>In the Engineering economics context, a sensitivity analysis reveals:</li> <li>a) How much the NPW will change in response to a given change in an input variable?</li> <li>b) How much the profit will change in response to a given change in interest rate?</li> <li>c) How much the sales price will change for a given change in cost price?</li> <li>d) How much loss a company can withstand?</li> </ul>	1	5	M9	1
27	<ul> <li>Scenario analysis is:</li> <li>a) The extent to which market changes affect sales price</li> <li>b) Change in NPW for a range of likely values of key variables</li> <li>c) The planning of manpower for aggressive sales</li> <li>d) The extent to which company's share price fluctuates with market fluctuations</li> </ul>	1	5	M9	1

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28	The IRR for a	a project having a life of	10 years with an ir	nitial investment of Rs.	1	1	M1,M	3	
	50,00,000 a	nd an net annual income	e of Rs. 4,50,000 is	equal to:			2		
		stanthan 00/							
	a) Gre	ater than 2%							
	c) Between 0.1 to 2%								
	d) Non	d) None of the ontions							
	.,								
29	If the interes	st rate is 16% per semi-a	nnual period, comp	oounded semi-	1	1	M1,	3	
	annually, the	e effective interest rate fo	or a semi-annual pe	eriod is:			M2		
	a) 16%	, D							
	b) 8%								
	c) Abo	ve 16%							
	d) Belo	ow 8%							
30	Specify whe	ther the following senten	ces as true or false	):	1	1	M1 M	2	
50	1. The	interest rate and paymer	t periods must hav	e the same time unit	-	-	1011,101	~	
	for th	ne factors to correctly acc	count for the time v	alue of money.			2		
	2. For f	inite-life alternatives, the	Annual Worth thro	ugh one life cycle is					
	equa	ii to the perpetual equiva	ient annual worth.						
	True, True								
	False, False	e							
	True, False	2							
	False True	2							
		-							
1A	Selected Fi	nancial information re	elated to ABC Pv	t. Ltd. are presented	4	3	M8	4	
	below:			·					
		In Rupees	2021	2022					
		(Rs.)							
		Sales	69 000	43 000					
		calco							
		Cost of	57,000	32,500					
		Goods Sold							
		Debtors	7,200	3,000					
		1	44 400	F 500					
		Inventories	11,400	5,500					
		Cash	1,500	800					
		Other	4,000	2,700					
		Current							
		Assets							
		Assels							



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		Current Liabilities	16,000	11,000				
	You are required to compute the Current ratio, Quick ratio, Average debt collection period and Inventory Turnover ratio for the year 2022. At the beginning of year 2021, the company had debtors of Rs. 2,500 and inventories of Rs. 3,000.							
18	<ul> <li><sup>1B</sup> ABC Ltd. expects the cost of a machine to produce a specific part to be Rs. 40,00,000. After 5-year useful life, the machine is expected to have a salvage value of Rs.8,00,000. The annual maintenance costs are believed to be Rs. 14,00,000. How many parts must the company sell per year to break even at 12% annual interest rate, if the variable cost of producing the part is Rs. 150 per unit and if the part can be sold for Rs. 400 per unit? What will be the breakeven sales, if the selling price of the part is reduced to Rs. 300 per unit to counter act with the competitor?</li> </ul>					3	M8	4
1C	How much money was deposited 35 years ago, at an interest rate of 6% per year, if it is sufficient to provide a perpetual income of \$10,000 per year starting from year 35 (First payment made at the end of year 35)?					1	M1,M 2	3
2A	<ul> <li>A Macintosh Printing, Inc., purchased a \$20,000 printing machine two years ago. The company expected this machine to have a seven-year life and a salvage value of \$5,000. The company spent \$5,000 last year on repairs, and current operating costs are running at the rate of \$8,000 per year. Furthermore, the anticipated salvage value of the machine has been reduced to \$2,500 at the end of the its remaining useful life. In addition, the company has found that the machine has a current market value of \$10,000.</li> <li>A sales person offers a new printing machine for \$18,000 with a useful life of 5 years. This new printer has no salvage value. The maintenance expenses of the new printer is \$6,000 annually. The company's MARR is 12%.</li> <li>a) Using Insider's point of view, analyze if the replacement needs to be made.</li> <li>b) If the useful life of the new machine is 6 years, conduct replacement</li> </ul>				4	1	M1,M 2	4
2B	A compan anticipates	y is planning expansion that \$500,000 would bonstruct factory building	ion of its facility be needed five year ong and \$250.000 it	after five years. It rs hence to purchase the following year	3	1	M1,M 2	3
	to purchase	e necessary machines.	To meet these exp	enses, the company				



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	is planning to set aside an equal amount every quarter from its profits for the next five years. Determine the amount the company must save, if the interest rates during the first three years is 12 % per year compounded quarterly, 12 % per year compounded monthly during the next two years and 12 % per year compounded semi-annually during the last one year.				
2C	A high-technology facilities manager, presented three different plans for	3	1	M1,M	3
	running a small weapons production facility. Plan X would entail			2	
	renewable one-year contract with one-million-dollar payments at the				
	beginning of each year. Plan Y would be a two-year contract with four				
	\$600,000 payments, the first of which would be made now and the other				
	three at 6-month intervals. Plan Z would be a three-year contract with a				
	\$1.5 million payment now and another \$0.5 million payment two years				
	from now. Assuming that the manager could renew any of the plans				
	under the same conditions, which plan is better on the basis of a Present				
	Worth analysis at an interest rate of 6% per year, compounded semi-				
	annually?				