

MANIPAL INSTITUTE OF TECHNOLOGY

V SEMESTER B.TECH. (COMMON TO ALL)

END SEMESTER MAKE-UP EXAMINATIONS- FEB 2022 (PROCTORED ONLINE EXAMINATION)

SUBJECT: ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT [HUM 3051] REVISED CREDIT SYSTEM

Time: 75 minutes

MAX. MARKS: 20

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- **1A.** A special-purpose machine is to be purchased at a cost of \$15,000. The following table **(04)** shows the expected Annual operating and maintenance cost and the salvage values for each year of the machine's service.

Years of Service	O&M Costs	Market Value
1	\$2,500	\$12,800
2	\$3,200	\$8,100
3	\$5,300	\$5,200
4	\$6,500	\$3,500
5	\$7,800	\$0

If the interest rate is 12%, what is the economic service life for this machine?

1B. A 50 HP motor is required to drive a pump to remove water from a tunnel. The unit will **(04)** be needed for a period of 4 years. Two alternatives are under consideration.

Alternative A calls for the construction of a power line and purchase of the electric motor at a total cost of \$4,900. The salvage value of this equipment after 4 years is estimated to be \$700. The cost of the current per hour of the operation is estimated to be \$2.94 and the maintenance is estimated as \$420 per year.

Alternative B calls for purchase of diesel engine pump set at a cost of \$1,925 and it will have no salvage value at the end of 4 years period. The cost of diesel per hour of operation is estimated at \$1.47 maintenance is estimated at \$0.53 per hour operation and the cost of wages chargeable when the engine runs is \$2.8 per hour.

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How many hours per year the two machines have to run so that the two alternatives incur equal costs. If the no. of hours of operation is estimated at 100 hours which alternative is more economical? Assume interest rate at 10% per year.

1C. Based on a 6-year analysis period that equals the useful life of the alternative, one **(02)** alternative has a net present worth of \$420 in a present worth analysis of portable hazardous material photoionization monitor.

The alternative device will be replaced at the end of the 6 years by a similar item with the same cost, benefits, and useful life. Calculate the net present value of the alternative equipment for the 12-year analysis period using 10% interest rate.

2. Find the balance sheet of Skanda Industries Ltd. as on 31st March 2021.

Liabilities	Amount	Assets	Amount
	(in Rs.)		(in Rs)
Equity share capital	10,000	Fixed Assets (less	26,000
7% Preference share	2,000	depreciation Rs.10,000)	
capital			
Reserves and Surplus	8,000	Current Assets:	
6% Mortgage Debentures	14,000	Cash	1,000
Current Liabilities:		Investments (10%)	3,000
Creditors	1,200	Sundry debtors	4,000
Bills payable	2,000	Stock	6,000
Outstanding expenses	200		
Tax provisions	2,600		

Other information:

- Net Sales Rs.60,000
- Cost of goods sold Rs.51,600
- Net Income before Tax Rs.4,000
- Net Income after tax Rs.2,000
- 2A. Calculate Turnover ratios viz. Stock Turnover ratios and Debtors Turnover ratio (Refer (03) Q.2 above).
- **2B.** Calculate the other key ratios given below (Refer Q.2 above):

(03)

Debt-Equity ratio

- Gross Profit Ratio
- Interest Coverage ratio
- Current ratio

2C. An engineering student bought a car at a local used car lot. Including tax and insurance, (04) the total price was (INR) 7,00,000. He is to pay for the car in 12 equal monthly payments, beginning with the first payment immediately (in other words, the first payment was the down payment). Nominal interest on the loan is 12%, compounded quarterly. After six payments (the down payment plus five additional payments), he decides to sell the car. A buyer agrees to pay a cash amount to pay off the loan in full at the time the next payment is due and also to pay the engineering student INR 2,00,000. If there are no penalty charges for this early payment of the loan, how much will the car costs to the new buyer?

10 %				Compound l	nterest Factors				10%
	Single Pa	yment	Uniform Payment Series				Arithmetic Gradient		
п	Compound Amount Factor Find F Given P F/P	Present Worth Factor Find P Given F P/F	Sinking Fund Factor Find A Given F A/F	Capital Recovery Factor Find A Given P A/P	Compound Amount Factor Find F Given A F/A	Present Worth Factor Find P Given A P/A	Gradient Uniform Series Find A Given G A/G	Gradient Present Worth Find P Given G P/G	п
1	1.100	.9091	1.0000	1.1000	1.000	0.909	0	0	1
2	1.210	.8264	.4762	.5762	2.100	1.736	0.476	0.826	2
3	1.331	.7513	.3021	.4021	3.310	2.487	0.937	2.329	3
4	1.464	.6830	.2155	.3155	4.641	3.170	1.381	4.378	4
5	1.611	.6209	.1638	.2638	6.105	3.791	1.810	6.862	5
6	1.772	.5645	.1296	.2296	7.716	4.355	2.224	9.684	6
7	1.949	.5132	.1054	.2054	9.487	4.868	2.622	12.763	7
8	2.144	.4665	.0874	.1874	11.436	5.335	3.004	16.029	8
9	2.358	.4241	.0736	.1736	13.579	5.759	3.372	19.421	9
10	2.594	.3855	.0627	.1627	15.937	6.145	3.725	22.891	10
11	2.853	.3505	.0540	.1540	18.531	6.495	4.064	26.396	11
12	3.138	.3186	.0468	.1468	21.384	6.814	4.388	29.901	12
13	3.452	.2897	.0408	.1408	24.523	7.103	4.699	33.377	13
14	3.797	.2633	.0357	.1357	27.975	7.367	4.996	36.801	14
15	4.177	.2394	.0315	.1315	31.772	7.606	5.279	40.152	15
16	4.595	.2176	.0278	.1278	35.950	7.824	5.549	43.416	16
17	5.054	.1978	.0247	.1247	40.545	8.022	5.807	46.582	17
18	5.560	.1799	.0219	.1219	45.599	8.201	6.053	49.640	18
19	6.116	.1635	.0195	.1195	51.159	8.365	6.286	52.583	19
20	6.728	.1486	.0175	.1175	57.275	8.514	6.508	55.407	20
21 22	7.400 8.140	.1351 .1228	.0156 .0140	.1156 .1140	64.003 71.403	8.649 8.772	6.719 6.919	58.110 60.689	21 22
23	8.954	.1117	.0126	.1126	79.543	8.883	7.108	63.146	23
24	9.850	.1015	.0113	.1113	88.497	8.985	7.288	65.481	24
25	10.835	.0923	.0102	.1102	98.347	9.077	7.458	67.696	25

12%				Compound	nterest Factors				12%
	Single Pa	yment		Uniform Payment Series			Arithmetic Gradient		
п	Compound Amount Factor Find F Given P F/P	Present Worth Factor Find P Given F P/F	Sinking Fund Factor Find A Given F A/F	Capital Recovery Factor Find A Given P A/P	Compound Amount Factor Find F Given A F/A	Present Worth Factor Find P Given A P/A	Gradient Uniform Series Find A Given G A/G	Gradient Present Worth Find P Given G P/G	п
1	1.120	.8929 7072	1.0000	1.1200	1.000	0.893	0	0	1
3 4	1.405	.7118 .6355	.2963 .2092	.4163 .3292	3.374 4.779	2.402	0.925	2.221 4.127	3
5	1.762	.5674	.1574	.2774	6.353	3.605	1.775	6.397	5
6 7 8	1.974 2.211 2.476	.5066 .4523 .4039	.1232 .0991 .0813	.2432 .2191 .2013	8.115 10.089 12.300	4.111 4.564 4.968	2.172 2.551 2.913	8.930 11.644 14.471	6 7 8
9 10	2.773 3.106	.3606 .3220	.0677 .0570	.1877 .1770	14.776 17.549	5.328 5.650	3.257 3.585	17.356 20.254	9 10
11 12 13 14 15	3.479 3.896 4.363 4.887 5.474	2875 2567 2292 2046 .1827	.0484 .0414 .0357 .0309 .0268	.1684 .1614 .1557 .1509 .1468	20.655 24.133 28.029 32.393 37.280	5.938 6.194 6.424 6.628 6.811	3.895 4.190 4.468 4.732 4.980	23.129 25.952 28.702 31.362 33.920	11 12 13 14 15
16 17 18 19 20	6.130 6.866 7.690 8.613 9.646	.1631 .1456 .1300 .1161 .1037	.0234 .0205 .0179 .0158 .0139	.1434 .1405 .1379 .1358 .1339	42,753 48,884 55,750 63,440 72,052	6.974 7.120 7.250 7.366 7.469	5.215 5.435 5.643 5.838 6.020	36.367 38.697 40.908 42.998 44.968	16 17 18 19 20
21 22 23 24 25	10.804 12.100 13.552 15.179 17.000	.0926 .0826 .0738 .0659 .0588	.0122 .0108 .00956 .00846 .00750	.1322 .1308 .1296 .1285 .1275	81.699 92.503 104.603 118.155 133.334	7.562 7.645 7.718 7.784 7.843	6.191 6.351 6.501 6.641 6.771	46.819 48.554 50.178 51.693 53.105	21 22 23 24 25
26 27 28 29 30	19.040 21.325 23.884 26.750 29.060	.0525 .0469 .0419 .0374 .0374	.00665 .00590 .00524 .00466 00414	.1267 .1259 .1252 .1247 .1241	150.334 169.374 190.699 214.583 241.333	7.896 7.943 7.984 8.022 8.055	6.892 7.005 7.110 7.207 7.207	54.418 55.637 56.767 57.814 58.782	26 27 28 29 30
31	33,555	.0298	.00369	.1237	271.293	8.085	7.381	59.676	31