Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

V SEMESTER B.TECH. (COMMON TO ALL)

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

SUBJECT: ENGINEERING ECONOMICS AND FINANCIAL

MANAGEMENT [HUM 3151]

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.

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 (in Rs.)	Assets	Amount (in Rs)
Equity share capital	10,000	Fixed Assets (less	26,000
7% Preference share capital	2,000	depreciation Rs.10,000)	
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?

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10%				Compound Interest Factors					10%	
	Single Payment			Uniform Payment Series				Arithmetic Gradient		
	Compound Amount Factor Find F Given P	Present Worth Factor Find P Given F	Sinking Fund Factor Find A Given F	Capital Recovery Factor Find A Given P	Compound Amount Factor Find F Given A	Present Worth Factor Find P Given A	Gradient Uniform Series Find A Given G	Gradient Present Worth Find P Given G		
n	F/P	P/F	A/F	A/P	F/A	P/A	A/G	P/G	n	
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	7.400	.1351	.0156	.1156	64.003	8.649	6.719	58.110	21	
22	8.140	.1228	.0140	.1140	71.403	8.772	6.919	60.689	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 Interest Factors — 12%

	Single Payment		Uniform Payment Series				Arithmetic Gradient		
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth	
	Find F Given P	Find P Given F	Find A Given F	Find A Given P	Find F Given A	Find P Given A	Find A Given G	Find P Given G	
n	F/P	P/F	A/F	A/P	F/A	P/A	A/G	P/G	n
1	1.120	.8929	1.0000	1.1200	1.000	0.893	0	0	1
2	1.254	.7972	.4717	.5917	2.120	1.690	0.472	0.797	2
3	1.405	.7118	.2963	.4163	3.374	2.402	0.925	2.221	3
4	1.574	.6355	.2092	.3292	4.779	3.037	1.359	4.127	4
5	1.762	.5674	.1574	.2774	6.353	3.605	1.775	6.397	5
6	1.974	.5066	.1232	.2432	8.115	4.111	2.172	8.930	6
7	2.211	.4523	.0991	.2191	10.089	4.564	2.551	11.644	7
8	2.476	.4039	.0813	.2013	12.300	4.968	2.913	14.471	8
9	2.773	.3606	.0677	.1877	14.776	5.328	3.257	17.356	9
10	3.106	.3220	.0570	.1770	17.549	5.650	3.585	20.254	10
11	3.479	.2875	.0484	.1684	20.655	5.938	3.895	23.129	11
12	3.896	.2567	.0414	.1614	24.133	6.194	4.190	25.952	12
13	4.363	.2292	.0357	.1557	28.029	6.424	4.468	28.702	13
14	4.887	.2046	.0309	.1509	32.393	6.628	4.732	31.362	14
15	5.474	.1827	.0268	.1468	37.280	6.811	4.980	33.920	15
16	6.130	.1631	.0234	.1434	42.753	6.974	5.215	36.367	16
17	6.866	.1456	.0205	.1405	48.884	7.120	5.435	38.697	17
18	7.690	.1300	.0179	.1379	55.750	7.250	5.643	40.908	18
19	8.613	.1161	.0158	.1358	63.440	7.366	5.838	42.998	19
20	9.646	.1037	.0139	.1339	72.052	7.469	6.020	44.968	20
21	10.804	.0926	.0122	.1322	81.699	7.562	6.191	46.819	21
22	12.100	.0826	.0108	.1308	92.503	7.645	6.351	48.554	22
23	13.552	.0738	.00956	.1296	104.603	7.718	6.501	50.178	23
24	15.179	.0659	.00846	.1285	118.155	7.784	6.641	51.693	24
25	17.000	.0588	.00750	.1275	133.334	7.843	6.771	53.105	25
26	19.040	.0525	.00665	.1267	150.334	7.806	6.892	54.418	26
27	21.325	.0469	.00590	.1259	169.374	7.943	7.005	55.637	27
28	23.884	.0419	.00524	.1252	190.699	7.984	7.110	56.767	28
29	26.750	.0374	.00466	.1247	214.583	8.022	7.207	57.814	29
30	29.960	.0334	.00414	.1241	241.333	8.055	7.297	58.782	30
31	33.555	.0298	.00369	.1237	271.293	8.085	7.381	59.676	31