# **Question Paper**

Exam Date & Time: 23-May-2022 (09:30 AM - 12:30 PM)



### MANIPAL ACADEMY OF HIGHER EDUCATION

## INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.Sc. (Applied Sciences) in Engg. END SEMESTER THEORY EXAMINATION - MAY/ JUNE 2022

#### ENGINEERING ECONOMICS AND MANAGEMENT [IHS 241]

Marks: 50

Duration: 180 mins.

#### Answer ALL questions Missing data may be suitably assumed

12%				Compound I	nterest Factors				12%
	Single Payment		Uniform Payment Series			Arithmetic Gradient			
n	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	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

#### Interest formulae

Single Payment Series	Compound Amount, (F/P, 1, n)	$F = P(1+i)^n$	
	Present Worth, $(\mathcal{P} \mathcal{F}, i, n)$	$P = F(1+i)^{-n}$	
Equal Payment Series	Compound Amount, (F.A. i, n)	[(1+0 <sup>*</sup> -1]	

	Sinking Fund, (A/F, i, n)	$\mathcal{A} = F\left[\frac{i}{(1+i)^n - 1}\right]$
	Present Worth, $i \mathcal{P}(A, i, n)$	$P = A \left[ \frac{(1+i)^n - 1}{i(1+i)^n} \right]$
	Capital Recovery, (A.P. i, n)	$A = P\left[\frac{i(1+i)^{n}}{(1+i)^{n}-1}\right]$
Gradient Series	Conversion factor, (A/G, 1, n)	$A = G\left[\frac{(1+i)^{n} - in - 1}{i(1+i)^{n} - i}\right]$

1)

A)

The following costs are estimated for two equal service tomato-peeling machines to be <sup>(5)</sup> evaluated by canning plant manager.

	Machine A	Machine B		
First Cost, Rs.	2,60,000	3,60,000		
Annual Maintenance Cost, Rs.	8,000	3,000		
Annual Labour Cost, Rs.	1,10,000	70,000		
Extra Annual Income Taxes, Rs.	-	26,000		
Salvage Value, Rs.	0.0	0.0		
Life, in Years	6	12		

If the minimum required rate of return is 12%, help the manager in deciding which machine to select. Use Present worth method.

B) Two machines models A and B perform the same function. Type A machine has a low (5) initial cost of Rs. 95000, relatively high operating cost of Rs.19,000 per year more than those of type B machine, and a short life of 4 years. Type B machine costs Rs. 2,51,000 and can be used for 8 years. The scrap value from either machine at the end of the life will be zero. Which is preferred when the rate of return is 12%? Use Annual Worth method

A) Sally McCarthy is an engineer for a new power plant. The plant can be fired by natural (5) gas, fuel oil, or coal. A decision must be made on which fuel to use. An analysis of the costs shows that the installed cost, with all controls, would be least for natural gas at \$30,000; for fuel oil it would be \$55,000; and for coal it would be \$180,000. If natural gas is used rather than fuel oil, the annual fuel cost will increase by \$7500. If coal is used rather than fuel oil, the annual fuel cost will be \$15,000 per year less. Assuming 12%

interest, a 20-year analysis period, and no salvage value, which is the most economical installation using Present worth method?

- B) Two options are available for setting up a wireless meter scanner and controller. A (5) simple setup is good for 2 years and has an initial cost of \$12,000, no salvage value, and operating cost of \$27,000 per year. A more permanent system has a higher first cost of \$73,000, but it has an estimated life of 6 years and a salvage value of \$15,000. It costs only \$14,000 per year to operate and maintain. Using Future worth method, identify the most economical alternative at 12%.
- <sup>3)</sup> Sam Health Care, Inc. purchased a new sonagram imaging unit for \$300,000, including <sup>(5)</sup> the truck chassis. The unit-truck system will be depreciated as one asset. The functional life is 8 years, and salvage is estimated at 10% of the purchase price of the imaging unit.

2)

Use straight line depreciation to determine the annual depreciation and book value after 4 years.

- B) Explain with relevant examples, Vision and Mission of an organization highlighting their <sup>(5)</sup> importance.
- <sup>4)</sup> Explain systems approach to Management with a neat sketch, focusing on the <sup>(10)</sup> importance of systems thinking in the current business scenario.
- <sup>5)</sup> Explain Maslow's hierarchy. As a manager how will you motivate your subordinates in <sup>(10)</sup> different levels of the needs described by Maslow?

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