

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



VII SEMESTER B.TECH (COMMON TO ALL) END SEMESTER EXAMINATION, NOV/DEC 2015

SUBJECT: ESSENTIALS OF MANAGEMENT & ENGINEERING

ECONOMICS [HSS 401]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- *** INTEREST TABLE** is provided in the last page (else use formula).
- ✤ Missing data may be suitably assumed.
- 1A) John, an accountant, is a reliable employee of SKC Plastics Ltd. John can (05) always be counted on to get his work done accurately and on time. He is punctual, works steadily and gets along well with other people. He has been in his current position of accounting specialist for seven years, but the fact that he has not been promoted recently is not of great concern to him. The pay is good, his supervisor is fair and not overly demanding, his work area is well-equipped, he likes the people he works with, and the company treats its employees well. Nevertheless, he looks forward to 5 p.m.! He is active outside the office-especially with hobbies and recreational pursuits. He is a member of the company football and basketball teams, and also dabbles in oil-painting. During the income-tax season, he enjoys helping friends to complete their personal tax returns. By drawing the Maslow's hierarchy, explain which of the needs in Maslow's hierarchy seem to be most important to John? How can you relate these factors to Herzberg's two factor theory?
- **1B)** Explain the following principles of management briefly with relevant (03) examples: Unity of direction, Order, and Equity.
- **1C)** What is upward and downward communication? Explain briefly with (02) examples.
- **2A)** Explain the Managerial Grid with a neat figure. Why it has been so popular (04) as a training device?

- **2B)** Explain the various activities of staffing with reference to a manufacturing (03) firm that is planning to start an IT subsidiary.
- **2C)** Explain the three types of Control with relevant examples. (03)
- **3A)** Briefly explain Business Portfolio matrix with examples. Also explain the (04) business strategies that evolved from BCG matrix.
- 3B) General Dynamics, one of the largest US defense contractors, had been (03) accused of improprieties. In order not to be suspended from bidding on defense contracts the company had to agree to a list of plans imposed by the US Defense Department.

These new requirements were designed to prevent the shifting of costs from one contract to another. For example, workers have to prepare and sign their own time cards. The supervisor has to check each card; If one is incorrectly filled out; the worker involved has to make the correction, which then has to be initiated by the worker and the boss. The original entry must not be erased so that it can be checked later. Employees are not allowed to accept gifts- not even a pen or a calendar.

Identify and explain three types of plans used in the above case.

- **3C)** Explain departmentation by simple numbers and departmentation by time (03) with examples.
- **4A)** Victor Insulators Inc. is considering replacing its broken inspection (06) machine, which has been used to test the mechanical strength of electrical insulators, with a newer and more efficient one.
 - If repaired, the old machine can be used for another five years, although the firm does not expect to realize any salvage value from scrapping it at that time. However, the firm can sell it now to another firm in the industry for INR 50,000. If the machine is kept, it will require an immediate INR 12,000 overhaul to restore it to operable condition. The overhaul will neither extend the service life originally estimated nor increase the value of the inspection machine. The operating costs are estimated at INR 20,000 during the first year, and these are expected to increase by INR 15,000 per year thereafter. Future market values are expected to decline by INR 10,000 per year.
 - The new machine costs INR 1,00,000 and will have operating costs of INR 20,000 in the first year, increasing by INR 8,000 per year thereafter. The expected salvage value is INR 60,000 after one year and will decline 15% each year. The company requires a rate of return of 15%. Find the economic life for each option, and suggest whether or not to replace the defender now.

- **4B)** A newly constructed building costs INR 5,00,00,000. The same building is (04) estimated to need renovation every 15 years at a cost of INR 50,00,000. Annual repairs and maintenance are estimated to be INR 10,00,000 per year for the first seven years and then increases to an amount of INR 12,50,000 from the eighth year onwards till fifteenth year and afterwards to an amount of INR 15,00,000 per year forever. If the interest rate is 15%, determine the capitalized cost of the bridge. Also, what is its equivalent annual cost?
- **5A)** Anita Tahani, who owns a travel agency, bought an old house to use as (03) her business office. She found that the ceiling was poorly insulated and that the heat loss could be cut significantly if 6 inches of foam insulation were installed. She estimated that with the insulation, she could cut the heating bill by \$40 per month and the air-conditioning cost by \$25 per month. Assuming that the summer season is three months (June, July, and August) of the year and that the winter season is another three months (December, January, and February) of the year, how much can Anita spend on insulation if she expects to keep the property for five years? Assume that neither heating nor air-conditioning would be required during the fall and spring seasons. If she decides to install the insulation, it will be done at the beginning of May. Anita's interest rate is 15% compounded monthly.
- **5B)** ABC Pvt. Ltd. is planning to sell its nine years old containerized transport (03) vehicles which were purchased for \$350,000 each with a service life of 15 years and a market value which was expected to decrease by \$21,000 each year. The operating cost is expected to be \$15,000 every year, with a salvage value of \$40,000 at the end of its life. Alternatively, the company can purchase a new vehicle for \$375,000 with a service life of 15 years and salvage value of \$90,000 and an equivalent annual cost of \$5,000 in the first year and then increases by \$800 every year thereafter. If the MARR is 15% per year, conduct the replacement analysis now and suggest whether or not the new vehicle has to be purchased.
- **5C)** An automobile that runs on electricity can be purchased for \$25,000. The (04) automobile is estimated to have a life of 12 years with annual travel of 20,000 miles. Every 3 years, a new set of batteries will have to be purchased at a cost of \$3,000. Annual maintenance of the vehicle is estimated to cost \$700. The cost of recharging the batteries is estimated at \$0.015 per mile. The salvage value of the batteries and the vehicle at the end of 12 years is estimated to be \$2,000. Suppose the MARR is 15%. What is the cost per mile to own and operate this vehicle, based on the preceding estimates? The \$3,000 cost of the batteries is a net value, with

the old batteries traded in for the new ones. (Use annual worth method)

- 6A) Upjohn Company purchased new packaging equipment with an estimated (03) useful life of five years. The cost of the equipment was \$35,000, and the salvage value was estimated to be \$5,000 at the end of year five. Compute the annual depreciation expenses over the five-year life of the equipment under each of the following methods of book depreciation:
 - (a) Straight-line method.
 - (b) Declining-balance method.
- **6B)** Two methods are under consideration for producing the case of a portable (03) hazardous material photoionization monitor. A plastic case will require an initial investment of \$75,000 and will have an annual operating cost of \$27,000 with no salvage after 2 years. An aluminium case will require an investment of \$125,000 and will have annual costs of \$12,000. Some of the equipment can be sold for \$30,000 after its three years of life. At an interest rate of 15% per year, which case should be used on the basis of a present worth analysis?
- **6C)** A new 10,000 square-meter warehouse next door to the Tyre Corporation (04) is for sale for \$450,000. The terms offered is \$100,000 down with the balance being paid in 60 equal monthly payments based on 15% interest compounding monthly. It is estimated that the warehouse would have a resale value of \$600,000 at the end of 5 years. Tyre Corporation has the needed cash available and could buy the warehouse, but does not need all the warehouse space at this time. The Johnson Company has offered to lease half the new warehouse for \$2500 a month.

Tyre presently meets its space requirement by rent where it utilizes 7000 square meters of warehouse space for \$2700 a month. It has the option of reducing the rented space to 2000 square meters, in which case the monthly rent would be \$1000 a month. Further, Tyre could cease renting warehouse space entirely (i.e. utilizing the bought warehouse for itself completely). Tom Clay, the Tyre Corp. plant engineer, is considering three alternatives:

- i) Buy the new warehouse and lease the Johnson Company half the space. In turn, the Tyre-rented space would be reduced to 2000 square meters.
- ii) Buy the new warehouse and cease renting any warehouse space.
- iii) Continue as is, with 7000 square meters of rented warehouse space.

Based on a 19% minimum attractive rate of return, which alternative should be selected? Use incremental rate of return analysis.

n	F/P	P/F	A/F	A/P	F/A	P/A	A/G	P/G
1	1.150	.8696	1.0000	1.1500	1.000	0.870	0	0
2	1.322	.7561	.4651	.6151	2.150	1.626	0.465	0.756
3	1.521	.6575	.2880	.4380	3.472	2.283	0.907	2.071
4	1.749	.5718	.2003	.3503	4.993	2.855	1.326	3.786
5	2.011	.4972	.1483	.2983	6.742	3.352	1.723	5.775
6	2.313	.4323	.1142	.2642	8.754	3.784	2.097	7.937
7	2.660	.3759	.0904	.2404	11.067	4.160	2.450	10.192
8	3.059	.3269	.0729	.2229	13.727	4.487	2.781	12.481
9	3.518	.2843	.0596	.2096	16.786	4.772	3.092	14.755
10	4.046	.2472	.0493	.1993	20.304	5.019	3.383	16.979
11	4.652	.2149	.0411	.1911	24.349	5.234	3.655	19.129
12	5.350	.1869	.0345	.1845	29.002	5.421	3.908	21.185
13	6.153	.1625	.0291	.1791	34.352	5.583	4.144	23.135
14	7.076	.1413	.0247	.1747	40.505	5.724	4.362	24.972
15	8.137	.1229	.0210	.1710	47.580	5.847	4.565	26.693
16	9.358	.1069	.0179	.1679	55.717	5.954	4.752	28.296
17	10.761	.0929	.0154	.1654	65.075	6.047	4.925	29.783
18	12.375	.0808	.0132	.1632	75.836	6.128	5.084	31.156
19	14.232	.0703	.0113	.1613	88.212	6.198	5.231	32.421
20	16.367	.0611	.00976	.1598	102.444	6.259	5.365	33.582
21	18.822	.0531	.00842	.1584	118.810	6.312	5.488	34.645
22	21.645	.0462	.00727	.1573	137.632	6.359	5.601	35.615
23	24.891	.0402	.00628	.1563	159.276	6.399	5.704	36.499
24	28.625	.0349	.00543	.1554	184.168	6.434	5.798	37.302
25	32.919	.0304	.00470	.1547	212.793	6.464	5.883	38.031
26	37.857	.0264	.00407	.1541	245.712	6.491	5.961	38.692
27	43.535	.0230	.00353	.1535	283.569	6.514	6.032	39.289
28	50.066	.0200	.00306	.1531	327.104	6.534	6.096	39.828
29	57.575	.0174	.00265	.1527	377.170	6.551	6.154	40.315
30	66.212	.0151	.00230	.1523	434,745	6.566	6.207	40.753

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Interest Rate	n	P/F	F/P	P/A	A/P	F/A	Interest Rate	n	P/F	F/P	P/A	A/P	F/A
1%	1	0.9901	1.01	0.9901	1.01	1	1.50%	1	0.9852	1.015	0.9852	1.015	1
	3	0.9706	1.03	2.941	0.34	3.03		3	0.9563	1.046	2.9122	0.3434	3.045
	6	0.9421	1.062	5.7955	0.1726	6.152		6	0.9146	1.093	5.6972	0.1755	6.23
	7	0.9327	1.072	6.7282	0.1486	7.214		7	0.901	1.11	6.5982	0.1516	7.323
	9	0.9143	1.094	8.566	0.1168	9.369		9	0.8746	1.143	8.3605	0.1196	9.559
	10	0.9053	1.105	9.4713	0.1056	10.462		10	0.8617	1.161	9.2222	0.1084	10.703
	15	0.8614	1.161	13.8651	0.0721	16.097		15	0.7999	1.25	13.3432	0.075	16.682
	20	0.8196	1.22	18.0456	0.0554	22.019		20	0.7425	1.347	17.1686	0.0583	23.124
	24	0.7876	1.27	21.2434	0.0471	26.973		24	0.6996	1.43	20.0304	0.0499	28.634
	25	0.7798	1.282	22.0232	0.0454	28.243		25	0.6892	1.451	20.7196	0.0483	30.063
	30	0.7419	1.348	25.8077	0.0388	34.785		30	0.6398	1.563	24.0158	0.0416	37.539
	60	0.5505	1.817	44.955	0.0223	81.67		60	0.4093	2.443	39.3803	0.0254	96.215
	n	P/F	F/P	P/A	A/P	F/A		n	P/F	F/P	P/A	A/P	F/A
1.25%	1	0.9877	1.013	0.9877	1.0126	1	2%	1	0.9804	1.02	0.9804	1.02	1
	3	0.9635	1.038	2.9265	0.3418	3.038		3	0.9423	1.061	2.8839	0.3468	3.06
	6	0.9282	1.077	5.7459	0.1741	6.191		6	0.888	1.126	5.6014	0.1785	6.308
	7	0.9168	1.091	6.6627	0.1501	7.268		7	0.8706	1.149	6.472	0.1545	7.434
	9	0.8943	1.118	8.4623	0.1182	9.463		9	0.8368	1.195	8.1622	0.1225	9.755
	10	0.8832	1.132	9.3454	0.1071	10.582		10	0.8204	1.219	8.9826	0.1113	10.95
	15	0.83	1.205	13.6004	0.0736	16.386		15	0.743	1.346	12.8493	0.0778	17.293
	20	0.7801	1.282	17.5991	0.0569	22.563		20	0.673	1.486	16.3514	0.0612	24.297
	24	0.7423	1.347	20.624	0.0485	27.788		24	0.6217	1.608	18.9139	0.0529	30.422
	25	0.7331	1.364	21.357	0.0469	29.135		25	0.6095	1.641	19.5235	0.0512	32.03
	30	0.6889	1.452	24.8886	0.0402	36.128		30	0.5521	1.811	22.3965	0.0447	40.568
	60	0.4746	2.107	42.0342	0.0238	88.573		60	0.3048	3.281	34.7609	0.0288	114.052