

UNIVERSITY OF ESWATINI  
RESIT EXAMINATION, SECOND SEMESTER  
JANUARY 2022

FACULTY OF SCIENCE AND ENGINEERING

**DEPARTMENT OF ELECTRICAL AND ELECTRONIC  
ENGINEERING**

TITLE OF PAPER: ENGINEERING MANAGEMENT  
COURSE CODE: EEE512

TIME ALLOWED: THREE HOURS

INSTRUCTIONS:

1. There are six questions in this paper. Answer any FIVE questions.  
Each question carries 20 marks.
2. If you think not enough data has been given in any question you may assume any reasonable values.
3. Useful formulas and Financial Table have been annexed to the paper.

PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS  
BEEN GIVEN BY THE INVIGILATOR

THIS PAPER CONTAINS TWELVE (12) PAGES INCLUDING THIS PAGE

## Question 1

Donna Jameson was recently hired as a financial analyst by Computron, a manufacturer of computer electronics. Her first task was to conduct a financial analysis of the firm covering the last two years. To begin, she gathered the following financial statements and other data.

BALANCE SHEETS	20x2 Ex000	20x1 Ex000
<b>Assets:</b>		
Current assets:		
Cash	1,200.00	2,350.00
Accounts receivable	6,000.00	4,000.00
Inventories	8,000.00	10,000.00
Prepaid expenses	300.00	120.00
Total current assets	15,500.00	16,470.00
Fixed assets		
Land	4000.00	4000.00
Buildings and equipment	12000.00	8500.00
Total fixed assets	16000.00	12500.00
Total assets	31500.00	28970.00

### **Liabilities and Equity:**

Current liabilities:		
Accounts payable	5,800.00	4,000.00
Notes payable	300.00	600.00
Accruals	900.00	400.00
Total current liabilities	7,000.00	5,000.00
Long term liabilities		
Long-term debt	7,500.00	8,000.00
Total liabilities	14,500.00	13,000.00
Equity:		
Stock	8,000.00	8,000.00
Paid in capital	1,000.00	1,000.00
Total paid in capital	9,000.00	9,000.00
Retained earnings	8,000.00	6,970.00
Total equity	17,000.00	15,970.00
Total liabilities and equity	31,500.00	28,970.00

## INCOME STATEMENTS

Sales	52,000.00	48,000.00
Cost of goods sold	36,000.00	31,000.00
Gross margin	16,000.00	17,000.00
Operating expenses:		
Selling expenses	7,000.00	6,500.00
Administrative expenses	5,860.00	6,100.00
Total operating expenses	12,860.00	12,600.00
Net operating income (EBIT)	3,140.00	3,900.00
Interest expense	640.00	700.00
Net income before taxes	2,500.00	3,200.00
Income taxes (30%)	750.00	960.00
Net income (or net-profit margin)	1,750.00	2,240.00

#### INDUSTRY AVERAGE DATA FOR 20x2

Ratio	Industry Average
Current	2.7x
Quick	1.0x
Inventory turnover	7.0x
Days sales outstanding (DSO)	32.0 days
Fixed assets turnover	10.7x
Total assets turnover	2.6x
Debt ratio	50.00%
Times Interest Earned (TIE)	2.5x
Fixed charge coverage	2.1x
Profit margin	3.50%
Basic earning power	19.10%
ROA	9.10%
ROE	18.20%
Price/earnings	14.2x
Market/book	1.4x

As part of the strategy execution processes, you have been assigned to work with Donna Jameson to prepare a report which evaluates the company's financial condition, compares the performance with the industry and further recommend action to improve the financial performance of the company in the following years (if necessary).

(20 marks)

## Question 2

- a) Your manager is in a senior management meeting, where the importance of developing policies and procedures is being discussed. He sends you an email, asking you to prepare a paragraph on 'why do organizations need policies and procedures'. Respond to the email. (4)
- b) You have been recruited as an Electrical Engineer in a manufacturing plant and you find that your recently acquired subordinates are doers and do not believe in planning. They have expressed their discomfort on several occasions, stating that planning is a waste of time. As the Engineer responsible you are aware of the importance/ significance of planning and you are planning to share this in your next meeting. List and discuss your talking points for this subject in the meeting. (12)
- c) What is an Engineering contract and why is it important? (4)

### Question 3

Midwest Manufacturing Company is considering two mutually exclusive investments. The projects' expected net cash flows are as follows:

Year	Project A	Project B
0	-E 300.00	-E 405.00
1	-E 387.00	E 134.00
2	-E 193.00	E 134.00
3	-E 100.00	E 134.00
4	E 600.00	E 134.00
5	E 600.00	E 134.00
6	E 850.00	E 134.00
7	-E 180.00	E 0.00

As the Projects Engineer for Midwest Manufacturing, you have been requested to write a motivation to Management for the selection of either Project A or Project B. Management would like to know the following information

- a) The 5 methods for appraising projects and their advantages (5 marks)
- b) The payback period for each project (4 marks)
- c) At 14% cost of capital calculate the NPV of each project (4 marks)
- d) At 8% cost of capital calculate the NPV of each project (4 marks)
- e) Selection of project with reasons (3 marks)

#### Question 4

- a) In one of your weekly meetings with your technicians, one of your employees' states that there is no need of management, as the work is being done by them. Your response to this is to explain to your technicians, the need of management in an organization. List and discuss the talking points for the discussion with your staff (technicians) explaining the need of management. (10 marks)
- b) You have been recruited as an Electrical Engineer in a manufacturing plant and you find that your recently acquired subordinates are doers and do not believe in planning. They have expressed their discomfort on several occasions, stating that planning is a waste of time. As the Engineer responsible you are aware of the importance/ significance of planning and you are planning to share this in your next meeting. List and discuss your talking points for this subject in the meeting. (10 marks)

### Question 5

- c) Since establishment, your company has not recognized unions. Employees are not happy and want to form a union. You have been requested to write a motivation to the Senior Management of the company, for the recognition of unions in your company. List and discuss your points of motivation. (10 marks)
  
- d) Discuss the various maintenance methods commonly used in industries. (10 marks)

### **Question 6**

Northwood Company has established a project management unit and has adopted the Project Management Body of Knowledge (PMBOK) framework to manage their projects. You have been appointed the Projects Engineer for Northwood Company and have to a conduct training session for the other engineers and technicians on the PMBOK framework. As part of the training preparations, list and discuss the elements of the PMBOK.

(20 marks)



<u>Ratio</u>	<u>Formula for Calculation</u>
<b>LIQUIDITY</b>	
Current	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
Quick, or acid test	$\frac{\text{Current assets} - \text{Inventories}}{\text{Current Liabilities}}$
<b>ASSET MANAGEMENT</b>	
Inventory Turnover	$\frac{\text{Sales}}{\text{Inventories}}$
Day's sales outstanding (DSO)	$\frac{\text{Receivables}}{\text{Annual sales}/360}$
Fixed assets turnover	$\frac{\text{Sales}}{\text{Net Fixed assets}}$
Total assets turnover	$\frac{\text{Sales}}{\text{Total assets}}$
<b>DEBT MANAGEMENT</b>	
Total debt to total assets	$\frac{\text{Total debt}}{\text{Total assets}}$
Times-interest-earned (TIE)	$\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{interest charges}}$
Fixed Charge Coverage	$\frac{\text{Earnings before interest and taxes} + \text{Lease payments}}{\text{Interest charges} + \text{Lease payments} + (5F \text{ payments} / 1-T)}$

## PROFITABILITY

Profit margin on sales	$\frac{\text{Net Income available to common stockholders}}{\text{Sales}}$
Basic earning power	$\frac{\text{Earnings before Interest and Taxes (EBIT)}}{\text{Total Assets}}$
Return on Total Assets (ROA)	$\frac{\text{Net income available to common stockholders}}{\text{Total Assets}}$
Return on Common Equity (ROE)	$\frac{\text{Net Income available to common stockholders}}{\text{Common Equity}}$

## MARKET VALUE

Price /earning (P/E)	$\frac{\text{Price Per Share}}{\text{Earnings Per Share}}$
Market/book	$\frac{\text{Market Price Per Share}}{\text{Book Value Per Share}}$

Present Value of 1 due at the end of the year shown Various  
Discounting Rates

Years	1%	2%	3%	4%	5%	6%	7%	8%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460
26	0.7720	0.5976	0.4637	0.3607	0.2812	0.2198	0.1722	0.1352
27	0.7644	0.5859	0.4502	0.3468	0.2678	0.2074	0.1609	0.1252
28	0.7568	0.5744	0.4371	0.3335	0.2551	0.1956	0.1504	0.1159
29	0.7493	0.5631	0.4243	0.3207	0.2429	0.1846	0.1406	0.1073
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994
31	0.7346	0.5412	0.4000	0.2965	0.2204	0.1643	0.1228	0.0920
32	0.7273	0.5306	0.3883	0.2851	0.2099	0.1550	0.1147	0.0852
33	0.7201	0.5202	0.3770	0.2741	0.1999	0.1462	0.1072	0.0789
34	0.7130	0.5100	0.3660	0.2636	0.1904	0.1379	0.1002	0.0730
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0676
36	0.6989	0.4902	0.3450	0.2437	0.1727	0.1227	0.0875	0.0626
37	0.6920	0.4806	0.3350	0.2343	0.1644	0.1158	0.0818	0.0580
38	0.6852	0.4712	0.3252	0.2253	0.1566	0.1092	0.0765	0.0537
39	0.6784	0.4619	0.3158	0.2166	0.1491	0.1031	0.0715	0.0497
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460
41	0.6650	0.4440	0.2976	0.2003	0.1353	0.0917	0.0624	0.0426
42	0.6584	0.4353	0.2890	0.1926	0.1288	0.0865	0.0583	0.0395
43	0.6519	0.4268	0.2805	0.1852	0.1227	0.0816	0.0545	0.0365
44	0.6454	0.4184	0.2724	0.1780	0.1169	0.0770	0.0509	0.0338
45	0.6391	0.4102	0.2644	0.1712	0.1113	0.0727	0.0476	0.0313
46	0.6327	0.4022	0.2567	0.1646	0.1060	0.0685	0.0445	0.0290
47	0.6265	0.3943	0.2493	0.1583	0.1009	0.0647	0.0416	0.0269
48	0.6203	0.3865	0.2420	0.1522	0.0961	0.0610	0.0389	0.0249
49	0.6141	0.3790	0.2350	0.1463	0.0916	0.0575	0.0363	0.0230
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213
51	0.6020	0.3642	0.2215	0.1353	0.0831	0.0512	0.0317	0.0197
52	0.5961	0.3571	0.2150	0.1301	0.0791	0.0483	0.0297	0.0183
53	0.5902	0.3501	0.2088	0.1251	0.0753	0.0456	0.0277	0.0169
54	0.5843	0.3432	0.2027	0.1203	0.0717	0.0430	0.0259	0.0157
55	0.5785	0.3365	0.1968	0.1157	0.0683	0.0406	0.0242	0.0145
56	0.5728	0.3299	0.1910	0.1112	0.0651	0.0383	0.0226	0.0134
57	0.5671	0.3234	0.1855	0.1069	0.0620	0.0361	0.0211	0.0124
58	0.5615	0.3171	0.1801	0.1028	0.0590	0.0341	0.0198	0.0115
59	0.5560	0.3109	0.1748	0.0989	0.0562	0.0321	0.0185	0.0107
60	0.5505	0.3048	0.1697	0.0951	0.0535	0.0303	0.0173	0.0099

Present Value of 1 due at the end of the year shown Various  
Discounting Rates

Years	9%	10%	11%	12%	13%	14%	15%	16%
1	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621
2	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432
3	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407
4	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523
5	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761
6	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104
7	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538
8	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050
9	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630
10	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267
11	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954
12	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685
13	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452
14	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252
15	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079
16	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930
17	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802
18	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691
19	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596
20	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514
21	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443
22	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382
23	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329
24	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284
25	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245
26	0.1064	0.0839	0.0663	0.0525	0.0417	0.0331	0.0264	0.0211
27	0.0976	0.0763	0.0597	0.0469	0.0369	0.0291	0.0230	0.0182
28	0.0895	0.0693	0.0538	0.0419	0.0326	0.0255	0.0200	0.0157
29	0.0822	0.0630	0.0485	0.0374	0.0289	0.0224	0.0174	0.0135
30	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0116
31	0.0691	0.0521	0.0394	0.0298	0.0226	0.0172	0.0131	0.0100
32	0.0634	0.0474	0.0355	0.0266	0.0200	0.0151	0.0114	0.0087
33	0.0582	0.0431	0.0319	0.0238	0.0177	0.0132	0.0099	0.0075
34	0.0534	0.0391	0.0288	0.0212	0.0157	0.0116	0.0086	0.0064
35	0.0490	0.0356	0.0259	0.0189	0.0139	0.0102	0.0075	0.0055
36	0.0449	0.0323	0.0234	0.0169	0.0123	0.0089	0.0065	0.0048
37	0.0412	0.0294	0.0211	0.0151	0.0109	0.0078	0.0057	0.0041
38	0.0378	0.0267	0.0190	0.0135	0.0096	0.0069	0.0049	0.0036
39	0.0347	0.0243	0.0171	0.0120	0.0085	0.0060	0.0043	0.0031
40	0.0318	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026
41	0.0292	0.0201	0.0139	0.0096	0.0067	0.0046	0.0032	0.0023
42	0.0268	0.0183	0.0125	0.0086	0.0059	0.0041	0.0028	0.0020
43	0.0246	0.0166	0.0112	0.0076	0.0052	0.0036	0.0025	0.0017
44	0.0226	0.0151	0.0101	0.0068	0.0046	0.0031	0.0021	0.0015
45	0.0207	0.0137	0.0091	0.0061	0.0041	0.0027	0.0019	0.0013
46	0.0190	0.0125	0.0082	0.0054	0.0036	0.0024	0.0016	0.0011
47	0.0174	0.0113	0.0074	0.0049	0.0032	0.0021	0.0014	0.0009
48	0.0160	0.0103	0.0067	0.0043	0.0028	0.0019	0.0012	0.0008
49	0.0147	0.0094	0.0060	0.0039	0.0025	0.0016	0.0011	0.0007
50	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006
51	0.0123	0.0077	0.0049	0.0031	0.0020	0.0013	0.0008	0.0005
52	0.0113	0.0070	0.0044	0.0028	0.0017	0.0011	0.0007	0.0004
53	0.0104	0.0064	0.0040	0.0025	0.0015	0.0010	0.0006	0.0004
54	0.0095	0.0058	0.0036	0.0022	0.0014	0.0008	0.0005	0.0003
55	0.0087	0.0053	0.0032	0.0020	0.0012	0.0007	0.0005	0.0003
56	0.0080	0.0048	0.0029	0.0018	0.0011	0.0007	0.0004	0.0002
57	0.0074	0.0044	0.0026	0.0016	0.0009	0.0006	0.0003	0.0002
58	0.0067	0.0040	0.0024	0.0014	0.0008	0.0005	0.0003	0.0002
59	0.0062	0.0036	0.002	0.0012	0.0007	0.0004	0.0003	0.0002
60	0.0057	0.0033	0.0019	0.0011	0.0007	0.0004	0.0002	0.0001