



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BUSINESS & ECONOMICS
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS
ADMINISTRATION WITH IT/ BACHELOR OF EDUCATION ARTS WITH IT/
BACHELOR OF EDUCATION SPECIAL NEEDS
1ST YEAR 1ST SEMESTER 2023/2024 ACADEMIC YEAR
MAIN & KISUMU CAMPUS

COURSE CODE: BAB 1105

COURSE TITLE: MANAGEMENT MATHEMATICS I

EXAM VENUE: LAB 13 & 14 STREAM: (BBA/BED ARTS/SNE)

DATE: 02/05/2024 EXAM SESSION: 9.00 – 11.00 AM

TIME: 2 HOURS

INSTRUCTIONS

- i. Answer question ONE(COMPULSORY) and any other two questions**
- ii. Candidates are advised not to write on the question paper**
- iii. Candidates must hand in their answer booklet to the invigilator while in the examination**

QUESTION ONE (30 MARKS)- COMPULSORY

- a) Differentiate between an annuity and a perpetuity (3 Marks)
- b) Outline four limitations of Break even analysis (4 Marks)
- c)
- d) Explain briefly five characteristics of an effective investment evaluation technique (8Marks)
- e) Pendekeza Investment firm has the following investment projects each of which needs an initial outlay of US \$1,000,000 but give different net cash flows (in US \$). The cost of capital is estimated to be 20%;

Year	1	2	3	4	5	6
Project A	300,000	500,000	100,000	550,000	400,000	200,000
Project B	280,000	420,000	500,000	450,000	300,000	150,000

f) **Required:**

Given that Projects A and B are mutually exclusive, Calculate the net present value of each project and state which project hence the project to considered? (15 Marks)

QUESTION TWO

- a) A project X costs US\$32,400 and is expected to generate the following inflows:

Period	US\$
Year 1	16,000
Year 2	14,000
Year 3	12,000

Required:

By interpolation method, determine the project's Internal Rate of Return (IRR) (8 Marks)

- b) Given that $U = \{X: 1 \leq X \leq 10, x \text{ is an integer}\}$ is a universal set, $A = \{1,2,3,4\}$, $B = \{2,4,5,6\}$ and $D = \{1,6,7,8,9\}$, find,

- i. $(A \cup B)^c$ (3 Marks)
- ii. $(A - D) \cap B^c$ (4 Marks)
- iii) Determine the power set of A above (2 Marks)

- c).Outline two limitations Pay back Technique as used in project evaluation. (3 Marks)

QUESTION THREE (20 MARKS)

- a) Solve by elimination and substitution, the following system of 3 by 3 equation

$$\begin{aligned}
 2x_1 + x_2 - x_3 &= 4 \\
 x_1 + x_2 - x_3 &= 3 \\
 2x_1 + 2x_2 + x_3 &= 12
 \end{aligned}$$

(7 Marks)

b) Differentiate the following terms giving appropriate example in each case

- i. Set difference and Set intersection (3 Marks)
- ii. Complement set and empty set (3 Marks)
- iii. Set union and power of a set (3 Marks)
- iv. Outline four assumptions of break even analysis (4 Marks)

QUESTION FOUR (20 MARKS)

A manufacturer of air conditioning units has fixed costs of \$300,000 and sales revenue of \$1,600,000. The variable costs are 75% of sales and remains constant irrespective of change in selling price

Required:

- i. The Net income (4 Marks)
- ii. Total Revenue at break even point (3 Marks)
- iii. The amount of change in net income if the company increases the selling price by 5% (7Marks)

Hint: Total contribution margin (CM)=Total Revenue (TR) -Total Variable costs (TVC)

$$CM \% = \frac{(TR - TVC)}{TR} \times 100$$

$$\text{Net income} = \text{CM} - \text{Fixed costs (FC)}$$

- iv) Explain four limitations of Pay Back investment Technique (6 Marks)

QUESTION FIVE (20 MARKS)

a) A factory that manufacturers and sales computer hard-drives incurs both fixed and variable costs in respect to the production process as follows:

Fixed cost includes Ksh.20,000 per month for rent, and utilities, Ksh. 120,850 per month for management salaries and Ksh.37,500 per month for equipment rental and lease. The variable cost are Ksh. 55 per unit for material and Ksh. 120 per unit for labour. The factory needs to sell 2445 units to break even per month.

Required

- i. The total revenue per month to break even (3 Marks)
- ii. The selling price per hard -drive (3 Marks)
- iii. Assuming every unit produced is sold, determine total revenue expected at the end of the year (3 Marks)
- iv. Annual profit if 3200 units are produced per month. (5 Marks)

b.) Tangaza Enterprises invested \$200 at the end of every month for 20 years into an ordinary simple annuity. Assume that the interest rate was Constant at 6% compounded monthly over the entire term. Determine the accumulated value of the investment at the end of the term, hence interest earned. (6 Marks)

Present Value Table (PVIF)

Present value of 1 i.e. $PVIF = 1/(1 + r)^n$

Where r = discount rate

n = number of periods until payment

Discount rate (r)

period

(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065

Present Value of Annuity Table

Present value of an annuity of 1 i.e. PVIFA =

Where r = discount rate

n = number of periods

ii. Discount Rate (r %)

Period

(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675