AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP, AND GOVERNANCE

NMMS 503: PROJECT ANALYSIS AND MANAGEMENT

FINAL EXAMINATION

MAY 2023

PROF S. MURAIRWA

3 HOURS

INSTRUCTIONS

Answer **ALL** questions *in **Section A** and **ANY TWO** questions in **Section B**.*

Start **each** question on a new page in your answer booklet.

The marks allocated to **each** question are shown at the end of the question.

Show all your workings.

Credit will be given for logical, systematic and neat presentations.

SECTION A: ANSWER ALL QUESTIONS

1. A bicycle manufacturing project
   a) Explain what actions a project manager might take to motivate his/her team. [**6 marks]**
   b) Draw and explain a diagram of the project life cycle showing the phases. State any four advantages for developing a life cycle. [**10 marks**]
   c) Draw a simple work breakdown structure for the manufacture of a bicycle. [**10 marks**]

2. A company is planning to install a new computerised production system. The company management determined the activities required to complete the project, the precedence relationships of activities, and activity time estimates as shown in the following table:

Activity	Activity predecessor	Time (weeks)				Cost ($)	
		Optimistic	Most likely	Pessimistic	Crash	Normal	Crash
A	-	5	8	17	7	4800	6300
B	-	3	12	15	9	9100	15500
C	A	4	7	10	5	3000	4000
D	A	5	8	23	8	3600	5000
E	B, C	1	1	1	1	0	0
F	B, C	1	4	13	3	1500	2000
G	D, E	3	6	9	5	1800	2000
H	D, E	1	2.5	7	3	0	0
I	H	1	1	1	1	0	0
J	F, G	2	2	2	2	0	0
K	G, I	5	8	11	6	5000	7000

   (a) What is the project completion time? [**10 marks**]
   (b) Assume the activity times are deterministic, crash the network to 26 weeks. Indicate how much it would cost the company and then indicate the critical path. [**6 marks]**
   (c) Develop the linear programming model for crashing the project to 26 weeks. [**8 marks**]

SECTION B: ANSWER ANY TWO (2) QUESTIONS

3. A new house construction project
   (a) Describe the barriers to communication and how they can be overcome in this project. [**5 marks]**
   (b) Describe the team recruitment process. Discuss how this process can positively or negatively affect productivity in this project. [**10 marks**]
   (c) State what is meant by a Health and Safety Plan. [**5 marks]**

   (d) Describe the difference between programme management and portfolio management. [**7 marks**]

4. The Ministry of Health is building a mini-laboratory for Africa University Clinic. The project is to be completed in 9 months, at a budgeted cost of $900 000. After a month, only 10 % of the project work has been completed at $100 000. The planned completion had been set at 15%.
   a) Analyse the project to determine the cost variance, schedule variance, cost performance index, and schedule performance index. [**8 marks**]
   b) How is the project progressing in terms of budget and schedule? [**4 marks**]
   c) Discuss the benefits of using Earned Value Management. [**8 marks**]
   d) Explain what is meant by a project environment. [**5 marks**]

5. The owner of a small supermarket has decided to install new electronic point of sales equipment in place of older ones. This will involve physical changes to the workplace for the check-out staff, new wiring, and changes to the way the staff work. The equipment is to be interfaced with existing stock control, which will require some modification. An equipment supplier has been contracted to design, supply the system, make modifications to the stock control software, train staff, and supervise the initial operation.
   a) Make whatever assumptions you think are reasonable about the division of responsibilities.
      i) Discuss the deliverables that could be specified for the project. [**5 Marks**]
      ii) What are the client responsibilities that the contractor's project manager might identify? [**6 Marks**]
      iii) Discuss the steps of designing a system of monitoring the project [**4 Marks**]
   b) Develop a project tactical risk assessment plan [**5 Marks**]
   c) Explain the process of forming a team for the project. [**5 Marks**]

End of paper

ADDITIONAL INFORMATION

1. $K = \frac{C_c - C_n}{M}$

2. $M = T_n - T_c$

3. Let:
   o = optimistic time estimate
   m = most likely time estimate
   p = pessimistic time estimate

   $Mean\ (Expected\ Time): t = \frac{o+4m+p}{6}$

   $Variance: \sigma^2 = \left(\frac{p-o}{6}\right)^2$

4. Social cost = Private costs + Negative Externalities

5. Social benefit = Private benefits + Positive externalities

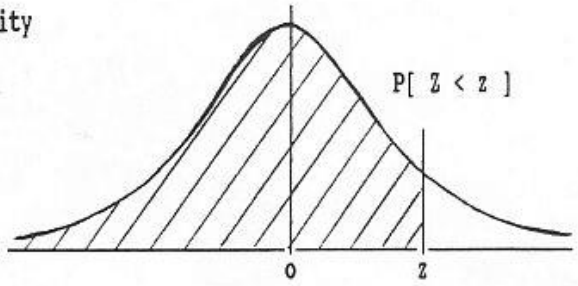
6. $Z = \frac{x-\mu}{\sigma}$

STANDARD STATISTICAL TABLES

1. Areas under the Normal Distribution

The table gives the cumulative probability up to the standardised normal value z

i.e. $$P[\ Z < z\ ] = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} \exp(-\tfrac{1}{2}Z^2)\ dZ$$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5159	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7854
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8804	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9865	0.9868	0.9871	0.9874	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9924	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9980	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
z	3.00	3.10	3.20	3.30	3.40	3.50	3.60	3.70	3.80	3.90
P	0.9986	0.9990	0.9993	0.9995	0.9997	0.9998	0.9998	0.9999	0.9999	1.0000