AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NMMS503: PROJECT ANALYSIS AND MANAGEMENT

END OF SECOND SEMESTER

APRIL 2022

PROF S. MURAIRWA

DURATION: 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 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? [**12marks**]

(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 [**6marks**]

(c) Develop the linear programming model for crashing the project to 26 weeks. [**8 marks**]

2. Interpersonal skills for project managers

Background: With the role of the line manager and senior manager somewhat defined, Company X believed that only individuals with specialised, interpersonal skills would become the project managers. The company contemplated the preparation of a list of "universal" skills necessary to function as a project manager.

The meeting between Vice President (VP) and Project Manager (PM)

VP: "I would like to see a list of desired personal characteristics for project managers included in our methodology. Surely this can be done."

PM: "I think we can define knowledge areas more easily than interpersonal skills. It is easier for us to decide whether or not the project manager needs a command of technology or understanding of technology by looking at the requirements of the project. But interpersonal skills are more complicated."

VP: "I don't understand why. Please explain!"

PM: "We appoint project managers to manage deliverables, not people. Our line managers are providing significantly more daily direction to the assigned workers than do our project managers."

VP: "Are you telling me that project managers do not require any management skills or interpersonal skills while managing projects?"

PM: "That is not really what I'm saying. I just believe that the skills needed to be a project manager are probably significantly different than the skills needed to be a line manager."

VP: "I agree! See what kind of list you can develop."

(a) Explain any five types of interpersonal skills for a project manager. [**5marks**]

(b) How do the interpersonal skills of a project manager differ from the skills needed to be an effective line manager? [**5marks**]

(c) With an iron triangle diagram, explain what is meant by project success? [**6 marks**]

(d) Construct a work breakdown structure for recruiting a new project manager. [**8 Marks**]

SECTION B: ANSWER ANY TWO (2) QUESTIONS

3. Consider a five-year project with an initial investment of \$200 000 in the first year and \$40000 in the 2nd, 3rdand 4th years and \$160 000 in the 5thyear. Estimated benefits in year one is \$0 and \$120 000 in each of the 2nd, 3rdand 4thyears.The fifth year has \$200 000. Using a discount rate of 8%,
   a) Analyse the project and compile an appraisal report. [**10marks**]
   b) Calculate the payback period. [**5marks**]
   c) Develop a project tactical risk assessment plan. [**10 marks**]

4. A company is replacing its software from analogue to digital. The project is expected to be completed in 8 months at a cost of \$20 000 per month. After 2 months, the project manager and his team realised that the project is 30% completed at a cost of \$80 000.
   a) Explain how the misunderstanding between the line manager and project manager could be handled by the company. [**5 Marks**]
   b) Discuss the project life cycle. Why is it iterative? [**10 marks**]
   c) Determine whether the project is on-time, on-budget after 2 months and forecast on estimates. [**10marks**]

5. Developing a new product for the company
   a) Discuss the two tools that are mainly used in mental building activities. [**15marks**]
   b) Using the theories of motivation or the theories of the nature of work, explain the likely motivations suitable for the project team members. [**10marks**]

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

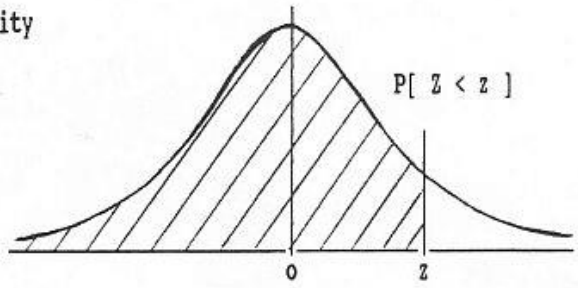
6. $Z = \frac{x-\mu}{\sigma}$

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