



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

University Examinations 2022/2023

MASTER OF SCIENCE IN MACHINE TOOLS DESIGN & MANUFACTURING

EMM 6110: PROJECT MANAGEMENT IN MOULD MAKING

DATE: APRIL 2022

TIME: 3 HOURS

INSTRUCTIONS

- (a) This examination contains SECTION A and SECTION B
- (b) SECTION-A is COMPULSORY
- (c) Answer QUESTION ONE and any other TWO questions.

SECTION A: COMPULSORY

QUESTION ONE: 30 MARKS

- (a) Define what is a project and discuss at least two principal project objectives (2 marks)
- (b) Discuss any four limitations of a Precedence Diagramming Method (PDM) (2 marks)
- (c) Discuss at least two main features of a Precedence Diagram (2 marks)
- (d) Explain four conflict resolution techniques (4 marks)
- (e) While evaluating the final budget of Project CV, the Company realised the project was non-profitable. Which reasons argue why the organization should proceed to implement project CV? (5 marks)
- (f) The following are the precedence requirements, normal and crash activity times and costs for a mould manufacturing project.

Activity	Preceding activities	Normal estimated time			Crash time (Wks)	Normal cost (\$)	Crash cost (\$)	Resources
		Optimistic	Most likely	Pessimistic				
A	-	2	4	6	3	8,000	11,000	3
B	A	3	7	10	5	30,000	35,000	6
C	A	2	3	5	3	6,000	6,000	4
D	B	4	7	9	4	24,000	28,000	6
E	D,E	12	16	20	12	60,000	72,000	12
F	C	2	5	8	4	5,000	6,500	4
G	E,F	2	2	2	2	6,000	6,000	2
H	G	2	3	4	2	4,000	4,000	2
I	G	2	3	5	2	4,000	5,000	2
J	H, I	2	4	6	2	4,000	6,400	3
K	J	2	2	2	2	5,000	5,000	2

- i. Draw and label an AOA network diagram (4 mark)
- ii. What are the critical path, estimated completion time, and project cost? (1 Mark)
- iii. Develop a modified AOA Gantt diagram showing activity slack and resource usage. (2 marks)
- iv. Develop the load diagram for the resource identified. (2 marks)
- v. What is the probability of finishing the project in (i) less than 38 days and (ii) more than 43 days? (3 marks)
- vi. Shorten the project by five weeks and determine the final project cost. (1 mark)



- vii. If you are limited to an additional cost of \$10,500 to cater for project shortening. What would be the estimated project duration and cost? (2 marks)

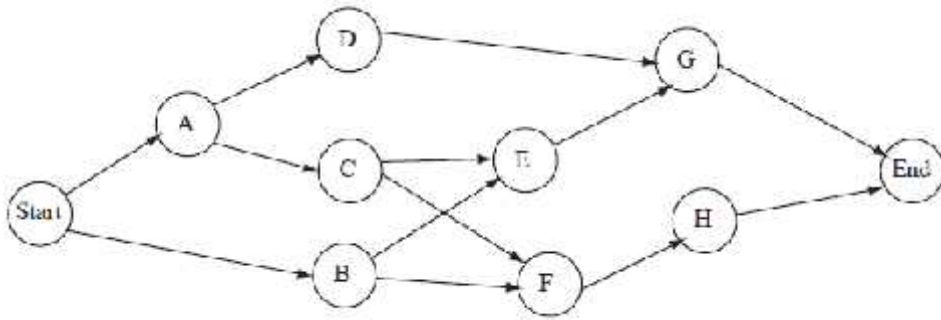
SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO: 20 MARKS

- (a) Define Project Portfolio Process (PPP) (1 mark)
- (b) With the aid of a diagram, illustrate a pure project organization structure (2 marks)
- (c) As a project manager addressing a conflict between stakeholders, demonstrate the application of the four-step principled negotiations process you would utilize. (2 marks)
- (d) Briefly discuss any SIX characteristics of a project (3 marks)
- (e) A company is deciding to undertake a project which lasts for three years. The expected total project cost is \$ 15,000 today, and the expected income after three years will be \$25,000. The discount rate is 10%. Should the Company undertake the project? (3 marks)
- (f) Distil bottlers uses a multi-cavity mould to produce their plastic can for juice packaging. The current mould has been in use for the last ten years and has recurring failures. The management is contemplating upgrading the mould or purchasing a new mould altogether. As a consultant to the Company, employ at least six process steps with examples that you will follow systematically to decide what the Company should pursue. (3 marks)
- (g) With the aid the Earned Value Chart sketch, explain the following terms and variances (6 marks)
- i) Budget at Completion and Estimated Cost at Completion
 - ii) Expected Cost (PV), Earned Value (EV)
 - iii) Cost Variance
 - iv) Schedule Variance
 - v) Time Variance

QUESTION THREE: 20 MARKS

- (a) Define what is a constraint in project management (1 mark)
- (b) As a project auditor, identify four challenges of indirect goals of Project auditing (2 marks)
- (c) As appointed project manager of a new project, defend using at least four points, why you would select a pure Projectized Organization structure (2 marks)
- (d.) List and briefly interpret at least four project constraints (2 marks)
- (e) List and briefly discuss the SIX major characteristics of a Project (3 marks)
- (f) As a project manager, you propose utilizing Agile project planning. Defend your decision using at least six project characteristics necessitating the decision. (3 marks)
- (g) The estimated activity times (in days) for the network below are given below.



Determine the following:

- i) The critical path expected duration of project and variance (3 marks)
- ii) The probability that the project will be completed in the duration given in (i) above. (1 mark)
- iii) The probability that the project will be completed within 20 days. (1 mark)
- iv) The probability that the project will be completed in 30 days. (1 mark)
- v) The completion time corresponds to a 95% probability. (1 mark)

Activity	Normal estimated time		
	Optimistic	Most likely	Pessimistic
A	6.5	7.5	14.5
B	8.5	10.5	12.5
C	2.5	3.5	4.5
D	6.5	7.5	8.5
E	5.5	5.5	9.5
F	5.5	7.5	9.5
G	4.5	6.5	8.5
H	2.5	3.5	3.5

QUESTION FOUR: 20 MARKS

- (a) Define the Project Selection in project management (1 mark)
- (b) Distinguish between Functional and Project Managers using four factors (2 marks)
- (c) Explain four reasons why crashing of activities often become necessary in project management (2 marks)
- (d) Consider a project with seven activities, as shown in the table below. The predecessors of each activity and the duration of the activities are given. The number of compressors (consider it a resource) required by each activity is also listed. The organization has only six compressors available with them.

Activity	Predecessors	Duration (days)	No. Of compressors needed
A	-	3	6
B	A	2	1
C	B	5	5
D	B	4	2
E	C	9	4
F	C, D	2	4
G	E, F	1	6



- i) Develop a schedule network diagram and determine the critical path. (4 marks)
- ii) Develop a schedule of the resources in the Gantt chart format (2 marks)
- iii) Show the current resource allocation using a histogram (2 marks)
- iv) Carry out the resource levelling and sketch the final Gantt chart and resource usage histogram (5 marks)
- v) What are the final duration of the project and the final critical path (2 marks)



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247