

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF BUILT ENVIRONMENT
BACHELOR OF QUANTITY SURVEYING
PART IV FIRST SEMESTER EXAMINATIONS JANUARY 2008**

CONSTRUCTION EQUIPMENT AND METHODS– AQS 4108

TIME: 3 Hours

TOTAL MARKS: 100

INSTRUCTIONS:

Answer any five questions

All questions carry equal marks

QUESTION 1

- a. Explain depreciation and obsolescence **(4marks)**
- b. Discuss the reasons for maintaining cumulative depreciation of equipment in books of accounts **(4marks)**
- c. A concrete mixer was purchased for \$ 900 000 000 on first March 1956 and the erection and installation of conveyers for mixer costs 14 000 000. This plant was replaced by a new one on the 28th February 1975. If the scrap value was estimated as \$300 000 000 what should be the rate of depreciation fund on 15th August 1965, by straight- line method.
If after 15 years of running, some assemblies are replaced and the replacement cost is \$30 000 000, what will be the new rate of depreciation? **(12 marks)**

QUESTION 2

- a. Discuss the advantages and disadvantages of Bar charts and C.P.M. in project scheduling. **(4marks)**
- b. State the major difference between
- i. The critical path and non – critical path
 - ii. Earliest finishing time and latest finishing time **(4marks)**
- c. Draw the network diagram of the project, whose activities are listed below. Trace the critical path and state the earliest time of the completion of the project. State and outline the paths that are there from start to finish. What will happen to the completion time if the duration of activity C-E is reduced by 50%. What will compress activity D-E by 50% have on the completion time?

Activity	Immediate Predecessor	Duration (months)
A-B	-	6
B-C	A-B	9
B-D	A-B	15
C-D	B-C	5
C-E	B-C	10
D-E	B-D, C-D	4
E-F	C-E, D-E	5

- i. Draw a PERT/ CPM network for this project **(3marks)**
- ii. Determine the earliest and latest start times for each activity **(3marks)**
- iii. Determine the earliest and latest finish times for each activity **(2marks)**
- iv. Calculate all floats for each activity **(2marks)**
- v. Find the critical activities for this project **(2 marks)**

QUESTION 3

- a. Ram hold Contractors Pvt Ltd is considering acquiring a JCB excavator to use for its upcoming projects. The Managing Director is not sure whether to purchase the excavator or not. You are required to advise the Managing Director on the likely factors that he is supposed to consider before purchasing the equipment. **(5marks)**
- b. Give a brief description of how a contractor can improve the economic life of his equipment. **(3 marks)**
- c. How many 0.5m³ dumpers are required to efficiently service a 6m³ per hour capacity concrete pump, if the concrete is being mixed 200m away and the travelling time per trip is 7 minutes including loading and unloading? **(12marks)**

QUESTION 4

- a) MNG, a small emerging Construction company recently won a tender for the construction of a church building in Manicabridge for Pentecostal Apostolic Church of God. The project involves massive concrete works. The planning department of MNG would like to make a decision concerning the acquisition of equipment necessary for the execution of works. Discuss the factors and the choice of buying or hiring equipment by MNG that will enable it maximize its profits. **(5marks)**

b) MNG Construction Company mentioned in (b) above decided to buy a dumper to use for transporting material within the site premises. The plant manager would like to know whether it's cheaper to hire a dumper or buy it. Given the following information:

- Cost of dumper \$150000.00
- Scrape value \$300000.00
- Depreciation Rate 20%
- Interest on Capital 5%
- Working Life 5years
- Repairs 30%
- Number of working weeks in a year 37
- Working hours hours per day 8
- Wages for operator per day \$100.00
- Cost of fuel, oil and grease per day \$50.00
- Consider 10% profit and 10% overheads

(15marks)

QUESTION 5

- a. How many 300NT (Approx 0.35m³) concrete mixers are required to place 154m³ of concrete in foundations in 6days? Allow 1/5 th of day for non-productive time and consider 5 minutes for each mixing cycle (including loading, mixing and discharge time) **(10marks)**
- b. An arrow diagram for a project is shown below. Show the critical path on the diagram giving the earliest and latest event times. Given time is in days. **(10marks)**

QUESTION 6

Given that the Contracts manager estimates the required resources for the execution of the activities shown in the network in (5) so as to have a clear picture of the likely project costs. The resources required for each and every activity are a shown in the following table.

You are required to produce a resource aggregation chart based upon

- i. Time- limited resource considerations
- ii. Resource limited resource considerations **(15marks)**

Activity	Immediate Predecessor	Duration (months)	Resources (Labourers)	Duration (months)
A	-	4	2	6
B	-	12	5	9
C	-	10	3	15
D	D	8	3	5
E	E	6	1	10
F	B	8	2	
G	C, D	10	3	
H	E	10	4	
I	F, G	0	2	
K	H, I	10	3	5
L	K	6	2	

Hence carry out a resource leveling process to the project and draw the resource-limited histogram given a resource limit of 5 labourers. **(5marks)**