



**THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE**

**((A Constituent College of JKUAT)**

(A Centre of Excellence)

**Faculty of Engineering &  
Technology in Conjunction with  
Kenya Institute of Highways and  
Building & Technology (KIHBT)**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**HIGHER DIPLOMA IN CONSTRUCTION**

(BUILDING ECONOMICS OPTION)

EBE 3119: MECHANICAL PLANT & EQUIPMENT I

**END OF SEMESTER EXAMINATION**

**SERIES: AUGUST 2012**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*
- *Drawing Instruments*

This paper consists of **FIVE** questions

Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

**Question One (20 Marks)**

- a) State **EIGHT** factors affecting choice of mechanical plant. **(8 marks)**
- b) Explain the following methods of plant acquisition
- i) Plant hire
  - ii) Hire purchase **(7 marks)**
- c) State **FIVE** advantages of hire purchase. **(5 marks)**

**Question Two (20 marks)**

- a) An item of plant has a cash price of kshs 1.2m . If it is bought on hire purchase, the following terms apply.
- Initial deposit 35%
  - Interest rate 15% per year
  - Repayment period of 3 years

Determine the following:-

- i) Deposit
  - ii) Extra cost compared with cash price
  - iii) Monthly payment
  - iv) Total purchase price. **(8 marks)**
- b) State **FOUR** factors that affect plant operating cost. **(4 marks)**
- c) Explain:-
- i) Ownership cost
  - ii) **SIX** forms of ownership costs. **(8 marks)**

**Question Three (20 marks)**

- a) State the **FIVE** factors influencing the cost of mechanical plant handling. **(5 marks)**
- b) State **FOUR** factors determining economic utilization of mechanical plant. **(4 marks)**
- c) Calculate the cost of owning and operating a tyred face shovel given the following data:
- Purchase price = 12.5m
  - Resale value = 4.5m
  - Useful life 6 years at 2000 hours per year
  - Average annual repairs and maintenance cost 780,000
  - Taxes, insurance is 5% of depreciation
  - Diesel consumed - 7 litres per 9 hours day at 80/= per litre
  - Operator's wages = 5000/= per week
  - Lubricating oil – 3 litres per week @ 120/= per litre
  - 2No Banksmen @ 300/= per day
  - Tyres – 3 sets @ 650,000 for six years
  - Cutting edges 2 sets @ 90,000 for six years
  - Overheads and profits 20% of the total costs. **(11 marks)**

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**Question Four (20 marks)**

- a) (i) Define plant depreciation  
(ii) State **THREE** factors that influences variation of maintenance costs. **(5 marks)**
- b) Briefly describe **THREE** main types of maintenance. **(9 marks)**
- c) A constructor purchases a plant at a cost of kshs 200,000. Its estimated economic life is 10 years. The average rate of depreciation per year is 25%. Prepare a schedule of depreciation cost of plant using the sum of years digit method.  
Assume scrap value of 20,000/= **(6 marks)**

**Question Five (20 marks)**

- a) State **SIX** causes of differences between a plant's rated output and its site output. **(6 marks)**
- b) Define the following:  
i) Operating factors  
ii) Serviceability factor  
iii) Utilization factor **(6 marks)**
- c) Drain laying project took 52 weeks a year, 5 days a week and 9 hours a day. Poor work planning kept the plant idle for 12 weeks. During the remaining time, the excavation could not do work because of breakdown for 6 hours each week.  
Determine:  
i) Operating factor  
ii) Serviceability factor  
iii) Utilization factor. **(8 marks)**