



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING
DIPLOMA IN MECHANICAL ENGINEERING
(Y2 S1)

EPL 2201: PLANT TECHNOLOGY I

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Steam tables*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** questions

All questions carry equal marks

Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required
This paper consists of **TWO** printed pages

Question One

- a) (i) State the purpose of a draught system in boilers.
(ii) Outline the types of draught systems
(iii) List the maintenance checks to be carried out on draught systems **(10 marks)**
- b) (i) State FIVE advantages of water tube boilers
(ii) State THREE causes of bagging (bulging) of the shell of an horizontal return tube boilers
(iii) Differentiate between externally fired boilers and internally fired boiler **(10 marks)**

Question Two

- a) (i) State any FIVE daily maintenance checks to be carried out on boilers.
(ii) Outline the procedure for cleaning boiler internal using chemicals **(10 marks)**

- b) A boiler plane suppliers 5400kg of steam per hour at 750KN/m² and 0.98dry from feed water at 41.5°C, when using 670kg of coal per hour when having a calorific value of 31,000KJ/kg

Calculate:

- (i) The Boiler efficiency
(ii) Equivalence evaporation from and at 100°C
(iii) The saving in coal/hr if by fitting an economizer it is estimated that the feed water could be raised at 100°C assuming other conditions remains constant and the efficiency of the boiler is increased by 5% **(10 marks)**

Question Three

- a) (i) Outline the procedure for shutting down a boiler
(ii) With reference to a boiler, name plate state any SIX parameters indicated
(iii) State the function of fusible plugs and where they are located **(10 marks)**
- b) (i) Define evaporation ratio with relations to boilers.
(ii) State TWO causes for the rise of exhaust flue gas temperature in a boiler
(iii) List any FOUR loss components in a heat balance of a boiler **(10 marks)**

Question Four

- a) (I) Explain briefly how to prime the following centrifugal pump installations
(i) Source of liquid above pump
(ii) Source of liquid below pump
(II) Outline the correct discharge piping of a centrifugal pump **(10 marks)**
- b) For the following pump trouble state any possible THREE causes and the remedy of each.
(i) Pump does not prime

- (ii) Pump delivers liquid
 - (iii) Pump takes excessive power
- marks)**

(10

Question Five

- a) (I) Outline the TWO types of petrol injection systems of internal combustion engines.
- (II) With reference to engine cooling systems, state any FOUR causes of following engine troubles.
- (i) Loss of coolant
 - (ii) Engine overheats
- (10 marks)**
- b) The following results were obtained during a trial of a four stroke petrol engine of cylinder bore, 200mm and stroke 400mm.

Effective brake wheel diameter = 1.6m
Speed 258rev/min
Effective brake load = 47kgf
Area of indicator diagram = 320mm²
Spring No 110KN/m² per mm
Length of indicator diagram = 65mm²
Spring No 110KN/m² per mm
Length of indicator diagram = 65mm²
Fuel consumption used/hr = 3.2kg/hr
Calorific value of fuel = 45MJ/kg

Calculate:

- (i) The mechanical efficiency
- (ii) Indicated thermal efficiency