



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

DIPLOMA IN MECHANICAL ENGINEERING
(DMEN Y2 S2)

EPL 2304: PLANT MAINTENANCE & WORK SERVICES DRAWING II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2014

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FOUR** questions. Attempt any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

Question One

A manufacturing plant for paper is required within vast coniferous woodland. The products envisaged are both quality and newsprint paper. The plant will incorporate the following production units:

A- Chips Preparation

- Logs Decks:
- Debarking drums: - Where a jet of high pressure water is directed tangentially to the logs strips away the bark cleanly, breaks it up and sluices it away.
- Bark press: - Stripped barks compressed and passed to the boiler.
- Chipper: - Stripped logs are chipped into small pieces by knives mounted in massive steel wheels.
- Mechanical pulp - Massive steel wheels
- Vibrating screens: - Some debarked logs ripped in hot water by steel discs.
- Chips bins: - Accepted chips stored
- Digester: - Chips are cooked in white liquor to remove lignin

B- Liquor Re-recovery Plant

- Direct contact evaporators: - Receive black liquor (spent liquor) and concentrated to around 35% in multiple-effect evaporator
- Recovery Furnace: - Liquor burned and steam generated molten salts are also produced. the remaining liquor converted into green liquor.
- Caustic cizing - Green liquor treated lime
- Settling tank:

Pulp Mill Plant

- Block tank: - Intermediate storage of cooked pulp (brown stock) before passing it to washers
- Brown stock chest - Brown stock screened to remove chips
- Pulp washers: - Brown stock washed to remove residue chemicals
- Bleaching towers: - Pulp bleached to remove brown colour
- Stock Tank: - Pulp stored in horizontal chests and agitated to suspend it.

- Knotters, rifflers and screens: - Where knots unreacted chips etc are removed

Paper Machine

- Beater: - Pulp washed and thickened before it is made into coarse sheets called 'laps'
- Jordan: - Laps, squared and pressed to dry
- Head box: - where laps are mixed to increase paper strength
- Dryers: - Where moisture is reduced further by stacking laps in hydraulic press
- Calendar: - paper cut into required sizes and stored or shipped.

Required:

Draw a good proportion layout of the processing plant and include all the necessary services.

(40 marks)

Question Two

- a) Illustrate an air supply and distribution to a room with a high ceiling using a downward and upward system of mechanical ventilation. **(6 marks)**
- b) Draw a circuit diagram of a small factory wiring for 3-phase, 4 wire electrical supply which incorporate the following:
- (i) Main fuse switch
 - (ii) Bus bar chamber
 - (iii) Switch fuses
 - (iv) 3-distribution
 - (v) Motor
- (6 marks)**
- c) Draw a two-line compressed air supply ring main supply system to a breathing mask, band and machine tools which incorporate the following:
- (i) Filters and auto drains
 - (ii) Regulators
 - (iii) Lubricants
 - (iv) Air traps
 - (v) Strainers
 - (vi) Drain traps
- (8 marks)**

Question Three

- a) Draw a one line isometric diagram of a water supply system to hose reels for a building with more than twenty storeys. **(6 marks)**
- b) Using graphical symbols, draw a hydraulic circuit which incorporates the following:
- (i) Power unit
 - (ii) Two pilot operated relief valves
 - (iii) One 4/3 way control valve

- (iv) Two pressure gauges
- (v) One non-return valve
- (vi) Two double acting cylinders
- (vii) One pressure reducing valve
- (viii) Two one way throttle valves **(8 marks)**

c) Draw a schematic diagram of hydrogen zeolite water treatment plant. **(6 marks)**

Question Four

- a) Draw an isometric view diagram of diesel power plant that includes the following systems:
- (i) Cooling system using a cooling tower
 - (ii) Fuel system which incorporate two tank one day tank
 - (iii) Compressed air starting system **(12 marks)**
- b) Illustrate steam supply system to a boiling pan that incorporate among others the following units:
- (i) Flash tank
 - (ii) Separator
 - (iii) Pressure reducing value
 - (iv) Sight glass
 - (v) Steam traps
 - (vi) Strainers