Instructions: (1) All Questions are compulsory.
              (2) Illustrate your answers with neat sketches wherever necessary.
              (3) Figures to the right indicate full marks.
              (4) Assume suitable data, if necessary.
              (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
              (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. Attempt any NINE of the following:  
   (a) State the applications of compressed air in industry.
   (b) State the classification of pumps.
   (c) Define compressor capacity and swept volume.
   (d) List the methods of energy saving in air compressor.
   (e) Define the term boiler efficiency.
   (f) Define suction head and delivery head of centrifugal pump.
   (g) State two provisions under Boiler Act for remedial measure.
   (h) Define break power and indicated power.
   (i) What is the purpose of Morse test? Name other methods.
   (j) Write down the function of foot valve.
   (k) State the sources of heat losses in boiler.

2. Attempt any FOUR of the following:  
   (a) Draw the labelled sketch of Cochran boiler.
   (b) Explain the process of priming of a centrifugal pump.
(c) What is staging? What are the advantages of multistage compression?
(d) Differentiate between two stroke engine and four stroke engine.
(e) State two points of differences between impulse turbine and reaction turbine. Also state two applications of each.
(f) State any four faults in working of centrifugal pump and suggest remedial action for the same.

3. Attempt any FOUR of the following: $4 \times 4 = 16$

(a) Write the possible causes and remedies for following in case of IC engine:
   (i) Bearing wear
   (ii) Irregular discharge
   (iii) Suction problem
   (iv) Excessive vibration

(b) During the test on single cylinder oil engine, working on four stroke cycle and fitted with a rope brake, the following readings are taken:
   - Spring balance reading – 30 N
   - Length of Indicator diagram – 60 mm
   - Effective diameter of brake wheel – 630 mm
   - Dead load on brake – 200 N
   - Area of Indicator diagram = 420 mm$^2$
   - Spring scale – 1.1 bar/mm
   - Diameter of cylinder – 100 mm
   - Stroke – 150 mm

   Calculate brake power and indicated power, if speed of the engine is 430 rpm.

(c) State and draw different types of casing used in centrifugal pump.
(d) Explain superheater and preheater in super critical boilers.
(e) State the four stages of compressed air preparation.
(f) Differentiate between fire tube and water tube boilers.