22232

3 Hours / 70 Marks Seat No. | | | | | | | | |

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.

Marks

1. Attempt any FIVE of the following : **10**

(a) State the first law of thermodynamics.

(b) Define wet steam and superheated steam.

(c) Define boiler mountings with two examples.

(d) Enlist four important components of I.C. engines.

(e) 'Break power is always less than indicated power'. Justify.

(f) Define one ton of refrigeration.

(g) State the function of capillary tube in window air conditioner.

2. Attempt any THREE of the following : **12**

(a) List various boiler accessories and write functions of each of them.

(b) Draw neat sketch of Babcock & Wilcox boiler. Also label all important parts of it.

(c) State the need of compounding of steam turbine and give its types.

(d) The following observations are made of centrifugal pump :

The total manometric head = 130 m of water

Total discharge of the pump = 0.32 m^3/s

Total input to the pump = 600 kW

Find overall efficiency of the pump.

3. Attempt any THREE of the following : **12**

(a) A self-start S.I. engine of motorcycle fails to start. State any four reasons and remedies thereof.

(b) Compare open and closed gas turbines on the basis of components and working.

(c) List any four pollutants in exhaust gases of I.C. engine with their effects on human being.

(d) A diesel engine, produces break power at a rate of 5.5 kW. The break thermal efficiency of the engine observed as 48%. Calculate indicated power and friction power of the engine.

4. Attempt any THREE of the following : **12**

(a) State different applications of compressed air.

(b) Suggest the type of air compressor for the following applications :

(i) Domestic refrigerator

(ii) Spray painting

(iii) Domestic cooler

(iv) Air filling in tubes of vehicle

(c) Explain two methods to reduce power consumption of air compressor.

(d) A dam is constructed to provide a 50 m head of water

(i) Name the relevant turbine that is used to generate power

(ii) Sketch the turbine you recommended.

(e) Suggest the suitable type of pump for the following cases with justification :

(i) Transferring water from lakes to fields

(ii) Pumping lubricants in diesel engine

5. Attempt any TWO of the following : **12**

(a) Explain with neat sketch the working of simple vapour compression system. Show clearly the physical state of the refrigerant passing through the different components during cycle.

(b) It is observed that when refrigerator is switched ON, the compressor does not start. Give the possible causes with remedies.

(c) Suggest the remedial action to be taken when following faults occur in window air conditioner :

(i) A.C. unit is not running

(ii) A.C. making more noise

(iii) Not getting desirable cooling effect

6. Attempt any TWO of the following : **12**

(a) Sketch the labelled layout of steam power plant and explain the process of power generation.

(b) Explain centrifugal pump with its neat sketch and constructional features.

(c) Suggest with justification the type of air conditioning system for :

(i) Computer lab with 50 computers

(ii) A city bus with 45 passengers capacity

(iii) A bedroom of 5 m × 5 m

(iv) A bank ATM
