

17559

11920

3 Hours / 100 Marks

Seat No.

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

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| <b>1. (A) Attempt any THREE :</b>   | <b>12</b>    |
| (a) State salient features of Energy Conservation Act, 2001.  |              |
| (b) Differentiate between conventional and non-conventional energy.   |              |
| (c) List any eight instruments used for energy audit.   |              |
| (d) Explain the concept of gasification of biomass.   |              |
| <b>(B) Attempt any ONE :</b>  | <b>6</b>     |
| (a) Explain 3T's of combustion. State the importance of excess air in combustion.   |              |
| (b) Explain power factor. A three phase motor with rated voltage 440 V and power 1.9 kW draws current of 2.5 A. Calculate power factor. |              |
| <b>2. Attempt any FOUR :</b>  | <b>16</b>    |
| (a) Explain in detail about the structure of energy audit report.   |              |
| (b) Explain features of PAT scheme.   |              |
| (c) Define calorific value. Estimate quantity of fuel required for a furnace.   |              |
| Given data  |              |
| Heat duty = 1000 kW   |              |
| Calorific value of heat = 20,000 kJ/kg  |              |
| Efficiency of furnace = 90%   |              |

- (d) State the advantages & disadvantages of direct method calculation for efficiency.
- (e) Explain importance of energy securing of the nation.
- 3. Attempt any FOUR :** **16**
- (a) With neat sketch explain working of box type solar cooker.
- (b) Explain any four energy conservation measures for cooling tower.
- (c) Give any four examples of benchmarking of utilities and production each.
- (d) Draw diagram of biogas plant and name it.
- (e) Explain primary and secondary energy sources with examples.
- 4. (A) Attempt any THREE :** **12**
- (a) Explain working of cooling tower. State its importance in chemical industry.
- (b) Derive expression for power in wind.
- (c) State the modes of heat transfer with two examples each.
- (d) Explain concept of geothermal energy. Draw block diagram of electricity generation from geothermal energy.
- (B) Attempt any ONE :** **6**
- (a) A liquid is heated from 25 °C to 90 °C. It is boiled at 90 °C. Calculate the amount of energy required in kJ.  
Latent heat = 560 kCal / kg  
Sp heat = 2 kCal / kg k  
Mass of liquid = 10 kg
- (b) Explain need of energy audit in industry. Give example of fuel substitution for boiler.
- 5. Attempt any TWO :** **16**
- (a) Explain various steps to check performance assessment of heat exchanger.
- (b) State different types of energy audit. Explain detailed energy audit with its various phases.
- (c) Suggest two alternatives for throttling in pump. How much % saving in energy if original impeller of pump is trimmed by 20% ?
- 6. Attempt any TWO :** **16**
- (a) Explain the term LMTD and overall heat transfer coefficient. List the data required for assessment of heat exchanger.
- (b) Explain working of solar water heater. How solar heat can be converted into electricity ? Explain with block diagram.
- (c) Explain working of FCB. Explain any four measures for energy conservation in boiler.
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