B.E. POWER ENGINEERING FOURTH YEAR FIRST SEMESTER
SUPPLEMENTARY EXAM 2023

ENERGY CONSERVATION

Time: Three hours   Full Marks: 100

Answer any **five** questions
Answers must be **brief and to the point. Marks will be deducted for excess writing**
Answers to all parts of the same question **must be together**

1. a) What are renewable and non-renewable energies? Give one example of each. Renewable energies are primary or secondary energies?   2+2+1=5
   b) What are commercial and non-commercial energies? Give one example of each. What is the most useful secondary energy?   2+2+1=5
   c) What is sustainable development? With a neat sketch, explain the sustainable as well as partially sustainable solutions.   10

2. a) What is Reserve by Production Ratio (R/P)? Is it relevant to renewable or non-renewable energy? Why?   2+1+2=5
   b) What are the most important fossil fuels in the earth? Are these only available fossil fuels on earth? Then why are these most important? Write two advantages and two limitations of any one of these.   3+1+2+4 = 10
   c) What is energy intensity? Why it is significant?   2+3=5

3. a) Define energy security. State four actions for better energy security.   1+4=5
   b) What is electric grid? Does it contribute to energy conservation? If yes, how?
                2+1+2=5
   c) State five benefits of energy conservation.   5
   d) What is the central nodal agency of India for energy conservation? What is the mission of that agency? State three salient activities of that agency.   1+1+3=5

4. a) What is cogeneration? Show the schematic of a basic heat engine and a cogeneration.   1+4=5
   b) Show the schematics of a condensing-extraction and a back pressure turbine for cogeneration with proper labelling. In a table state the suitable application areas of these two cogenerations.   3+3+4=10
   c) Write the expression of Fuel Energy Savings Ratio (FESR) explaining all terms. Why reference efficiencies of power and utility heat supply are important for FESR?   3+2=5

5. a) What is continuous condition monitoring of a device? Why it helps energy conservation? Draw a neat schematic of boiler operation with all inputs and outputs and identify which parameters are to be monitored for better energy conservation.   2+2+6=10
   b) Discuss the significance of continuous monitoring of excess air control and boiler blow down.   5+5=10

[Turn over

6. a) How energy storage helps energy conservation? Why is it specifically important for most of the renewable energy systems?   3+2=5

b) What is waste heat recovery (WHR)? Draw a neat schematic explaining opportunities of WHR in a process plant.   2+3=5

c) With a neat schematic explain the process of operation of a heat wheel. Why rotational speed of a heat wheel is an important parameter?   8+2=10

7. Write short notes on the following: 5x4=20

a) Heat pipe b) Return on investment c) Availability based tariff (ABT), d) Demand side management (DSM)