# PSG POLYTECHNIC COLLEGE, COIMBATORE - 641 004

## DIPLOMA ODD SEMESTER EXAMINATIONS – NOV 2014

## M12403/D12403 - HEAT POWER ENGINEERING

**Time : 3 Hours**                                                            **Max.Marks: 100**

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### Instructions:

1. **Group A** and **Group B** questions should be answered in the Main Answer book.
2. Answer any **TEN** questions in **Group A**. Each question carries 3 marks.
3. Answer **ALL** questions either **(a)** subdivision or **(b)** subdivision in **Group B**. Each question carries 14 marks.

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### Group – A                                            **Marks**: 10 x 3 = 30

1. What is meant by adiabatic process? Sketch the process on p-V and T-S diagrams.

2. Define air cycles and air standard efficiency.

3. Write any four differences between petrol and diesel engines.

4. Distinguish between wet steam and superheated steam.

5. What are the various sources of heat losses in a boiler?

6. What is a steam condenser? How it is classified?

7. What are the uses of compressed air?

8. State the advantages of multi stage compression.

9. What are the applications of gas turbines?

10. Define the ton of refrigeration.

11. Define relative humidity.

12. Mention any four psychometric processes.

13. Write any four non-conventional sources of energy.

14. What are the advantages of solar energy?

15. Write any four comparisons between nuclear and thermal power plants.

### Group – B                                            Marks: 5 x 14 = 70

16. a) A diesel engine has a clearance volume of 0.00025 $m^3$ and a bore & stroke of 152.5 mm & 200 mm respectively. A charge of air at 100 kN/$m^2$ & 20°C is taken into the cylinder & compressed adiabatically. After combustion at constant pressure the temperature reaches to 1096°C. The expansion, which follows, is adiabatic. The cycle is closed by constant volume process finally. If $\gamma$ = 1.4, determine.
   (i) The temperature & pressure at the end of compression.
   (ii) The temperature & pressure after expansion.
   (iii) The ideal thermal efficiency of engine.

**(OR)**

b) Explain the working of four stroke petrol engine with neat sketches.

17. a) A boiler generates 750 kg of steam per hour at 11 bar absolute and with $40^{o}$C superheat and burns 100 kg of coal per hour. If the calorific value of coal is 29,300 kJ/kg, feed water temperature is $45^{o}$C and the specific heat of superheated steam is 2.09 kJ/kg K. Calculate (i) actual evaporation, (ii) factor of evaporation, (iii) equivalent evaporation, (iv) boiler efficiency and (v) boiler power.

**(OR)**

b) (i) Explain the principle of operation of a reaction turbine. **(7)**

(ii) What is a steam condenser? Explain with a neat sketch the working of surface **(7)**
condenser.

18. a)  Explain the working of a single stage reciprocating air compressor with a neat sketch.

**(OR)**

b)  Explain the working of constant pressure open cycle gas turbine.

19. a) Explain the working of vapour compression refrigeration system with a neat sketch.

**(OR)**

b) Explain the working of a central air conditioning plant with a neat sketch.

20.a) Draw the schematic layout of thermal power plant and explain.

**(OR)**

b) (i) Explain the nuclear reactor with a neat sketch. **(8)**

(ii) What are the advantages and disadvantages of wind energy power plant? **(6)**

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