A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54704

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019
Fourth Semester
Mechanical Engineering
15UME404 - THERMAL ENGINEERING
(Regulation 2015)
(Steam Table and Refrigeration tables are permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Petrol engine works on_____ CO1- R

   (a) Constant pressure cycle (b) Constant volume cycle

   (c) Joule cycle (d) Rankine cycle

2. Which of the following cycle has the highest efficiency ? CO1- R

   (a) Otto cycle (b) Carnot cycle (c) Stirling cycle (d) Joule cycle

3. A carburetor is used to supply CO2- R

   (a) Petrol ,air and lubrication oil (b) Air and diesel

   (c)Petrol and lubricating oil (d) Petrol and air

4. The spark plug is used in CO2- R

   (a) Petrol engine (b) Diesel engine (c) Steam engine (d) None of the above

5. The flow of steam is super sonic CO3- R

   (a) At the entrance to the nozzle (b) At the throat of the nozzle

   (c) In the convergent portion of the nozzle (d) In the divergent portion of the nozzle

6. Thermal equilibrium means that the flow of steam is CO3- R

   (a) Isothermal (b) Isentropic (c) Hyperbolic (d) Polytropic

7. The absolute pressure of air at the outlet of a compressor is called CO4- R

(a) Back pressure (b) Critical pressure (c) Discharge pressure (d) None of these

8. The volume of air delivered by the compressor is called CO4- R

(a) Free air delivery (b) Compressor capacity (c) Swept volume (d) None of these

9. In refrigerating machine ,heat rejected is_____heat absorbed CO5- R

(a) Equal to (b) Less than (c) Greater than (d) None of these

10. During vapour compression process heat absorbed on the refrigerant in CO5- R

(a) Condenser (b) Evaporator (c) Compressor (d) None of these

PART – B (5 x 2= 10 Marks)

11. Mention the four thermodynamic process involved in diesel cycle CO1- R

12. What are the functions of piston rings ? CO2- R

13. What are the different methods of governing steam turbines ? CO3- R

14. Define the term isothermal compressor efficiency CO4- R

15. Define ton of refrigeration . CO5- R

PART – C (5 x 16= 80Marks)

16. (a) An Otto cycle has a compression ratio of 7 .The initial pressure and temperature at the beginning of compression stroke is 1bar and 40^0 c. The heat supplied is 2510 KJ/Kg .Find CO1- App (16)

(i) The maximum temp and pressure

(ii) Work done per Kg of air

(iii) The cycle efficiency

(iv) Mean effective pressure

Take $C_{v=}$ 0.713 KJ/Kg K and R= 287 J/Kg K

Or

(b) Derive an expression for the air standard efficiency of Brayton cycle in terms of pressure ratio also suggest the methods of improvement of efficiency. CO1- App (16)

17. (a) Discuss the construction and working principle of a four stroke CIengine with sketch . CO2- U (16)

Or

(b) What are the different methods of lubricating IC engine ? Explain the pressure system of lubrication with a neat sketch . CO2- U (16)

18. (a) Steam at 14 bar and 280^0c is passed through a convergent nozzle at a rate of 40 Kg/min and it is discharged into a chamber where the pressure is maintained at 3bar Neglecting the friction and assuming flow as super saturated ; Determine the dimension of nozzle at exit Which is rectangular in shape with ratio of side is 1:3.Also find the degree of super saturation and degree of under cooling. CO3- Ana (16)

Or

(b) Explain the pressure and velocity compounding diagram of a multi stage turbine with sketch. CO3- U (16)

19. (a) A single acting reciprocating air compressor has a piston diagram of width 200 mm and a stroke of 300mm and runs at 350 rpm .Air is drawn at 1.1 bar pressure and is delivered at 8 bar pressure .The law of compression is $PV^{1.35} = C$ and clearance volume is 6% of the stroke volume .Determine the power required to drive the compressor. CO4- U (16)

Or

(b) Explain the construction and working principles of multistage compressor and discuss the perfect and imperfect inter cooling with neat sketch. CO4- U (16)

20. (a) Explain the construction and working of vapour compression refrigeration system with neat sketch . CO5- U (16)

Or

(b) Describe the working of summer air conditioning system suitable for hot and wet weather and for hot and dry weather with simple component diagram. CO5- U (16)