Total No. of Printed Pages:2

SUBJECT CODE NO:- H-1300
FACULTY OF SCIENCE AND TECHNOLOGY
T.Y. B.Tech.(Mech) (Sem-V)
I.C. Engine & Turbines
[Old]

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

N.B
1) Solve any three questions from each section Q. No. 1 and Q. No. 6 are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data if necessary.
4) Use of non – programmable calculator is permitted.

SECTION – A

Q.1 Answer any five of the following. 10
a) Why a very rich mixture is required for maximum power?
b) What is petrol injection?
c) What are the factors which affect the process of carburetion?
d) What are the factors which affect the tendency to detonate?
e) Does the flame front exist in CI engine? Explain.
f) What is meant by octane and cetane number of fuel?

Q.2 a) Derive an expression for air/ fuel ratio taking compressibility into account. 07
b) Describe battery ignition system with the help of neat sketch. 08

Q.3 a) Discuss the following important designs of overhead valve combustion: 07
i) Bath – tub type
ii) Wedge type
b) Explain phenomenon of diesel knock. Compare it with the phenomenon of detonation in SI engines. 08

Q.4 a) Discuss the basic requirements of a spark – ignition system. 05
b) A simple jet carburetor is required to supply 6 kg air per minute and 0.45 kg of fuel of density 740 kg/m^3. The air is initially at 1.013 bar and 27℃. Calculate the throat diameter of the choke for a flow velocity of 92 m/s. velocity coefficient =0.8. If pressure drop across the fuel meter in g orifice is 0.75 of that at the choke, calculate orifice diameter assuming Cd=0.60. 10

Q.5 a) Explain in brief the air – craft carburetion system. 05
b) The following readings are obtained from a test on a single cylinder oil engine working on the Two stroke cycle; 10
Engine speed = 300 rpm, Net Brake Torque = 500 Nm.
Indicated mean effective pressure = $4.9 \times 10^5 N/m^2$, fuel consumption 5 kg/ min, temperature rise of cooling water = 55k, specific capacity of water =4.1868 KJ/Kg K, Cylinder bore = 200 mm, stroke = 250 mm.
Calculate:
a) The mechanical efficiency.

b) The specific fuel consumption
c) Draw up an energy balance in kw, if the calorific value of fuel is 44000 KJ/Kg.

SECTION – B

Q.6 Answer any five from the following. 10

a) What is the major advantage of ethanol with alcohol gasoline blends?
b) What are the effects of engine speed on the exhaust emission?
c) What are the effects of intercooling on performance of gas turbine?
d) What do you mean by compounding of steam turbine? What are the methods of compounding?
e) Define blade efficiency and stage efficiency of steam turbines.
f) What do you understand by the term turbocharging?

Q.7 a) Discuss different losses in steam turbine. 03

b) The following data relate to a single stage impulse turbine: 12
Stage impulse turbine:
Steam velocity -600 m/s
Blade speed – 250 m/s
Nozzle angle - 20^0
Blade outlet angle -25^0
Neglecting the effect of friction.
Calculate the work developed by the turbine for the steam flow rate of 20 kg/s.
Also calculate the axial thrust on the bearings.

Q.8 a) Derive the expression for efficiency and specific work output for a simple gas turbine cycle in terms of pressure ratio. 07

b) Describe with a sketch a typical gas in turbine combustion chamber. 08

Q.9 a) Explain pressure compounding of steam turbine with neat sketch. 08

b) What are different methods of turbo charging? Explain any two in detail. 07

Q.10 a) Explain i) vane Blower ii) centrifugal compressor type of superchargers. 05

b) What are the supercharging limits for SI and CI engines? 05

c) Write theory of simple ideal gas turbine with the help of neat sketch. 05