Registration no: | | | | | | | | | | |

Total Number of Pages: 02

B.TECH
PCME4302

5th Semester Back Examination – 2017-18
I.C. ENGINES AND GAS TURBINES
BRANCH(S): MECH
Time: 3 Hours
Max marks: 70
Q. code: B270

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What do you mean by Scavenging and Supercharging?
b) What do you mean by equivalence ratio? What should be the value for lean mixture and rich mixture?
c) How to find Octane number by using performance number?
d) Sketch the idling system in carburettor.
e) What do you mean by Dwell angle?
f) Draw time Vs cylinder pressure for combustion with and without knock for both SI & CI engine.
g) What do you mean by EGR?
h) What are the basic propellants are used in rockets?
i) What do you mean by propulsive efficiency? Which engine having more propulsive efficiency
j) Discuss the pros and cons of inducting a regenerator to a GT cycle

Q2 The compression ratio of engine is 10 and the temperature and pressure at the start of compression is 37° C and 1bar. The compression and expansion processes are both isentropic and the heat rejected at exhaust at constant volume. The amount of heat added during the cycle is 2730 kJ/kg. Determine the mean effective pressure and thermal efficiency of the cycle if (i) the maximum pressure is limited to 70bar and heat is added at both constant volume and constant pressure and (ii) if all the heat is added at constant volume. In this case how much additional work per kg of charge would be obtained if it were possible to expand isentropically the exhaust gases to their original pressure of 1 bar? Assume that the charge has the same physical properties as that of air **(10)**

Q3 **a)** A simple carburetor is designed to supply 6kg of air per min. and 0.4kg of fuel per min. The density of the fuel is 770kg/m^3. The air is initially at 1bar and 17^{o}C. Calculate the venturi throat diameter if the velocity of air at throat is 100 m/s. Assume C_{da}=0.84. C_{df}=0.65 and γ=1.4. If the drop across the fuel metering orifice is 0.85 of the pressure at the throat. **(6)**

b) Explain alcohols are the alternate fuels for IC engines bringing out their merits and demerits **(4)**

Q4 **a)** A four cylinder, four stroke diesel engine develops 100 kW at 3500 rpm. Its bsfc =180gm/kW-hr. Calculate the quantity of fuel to be injected per cycle per cylinder. Specific gravity of fuel=0.88 **(5)**

b) Explain the various mechanism of lubrication and their functions **(5)**

Q5 **a)** A four stroke gas engine having a cylinder of 250 mm diameter and stroke 450mm as a volumetric efficiency of 80%, ratio of air to gas is 8 to 1. Calorific value of gas is 20MJ/m^3 at NTP. Find the heat supplied to the engine per working cycle. If the compression ratio is 5, what is the heating value of the mixture per working stroke per m^3 of the total cylinder volume? **(5)**

b) Explain battery ignition system and magneto ignition system and their differences. **(5)**

Q6 What do you mean by ignition delay and abnormal combustion? Explain the phenomena of knock in CI engine and compare it with SI engine knock **(10)**

Q7 Determine the specific work output, specific fuel consumption and cycle efficiency for a simple cycle gas turbine with a free power turbine given the following specification **(10)**

compressor pressure ratio	12
Turbine inlet temperature	1350K
Isentropic efficiency of	0.86
compressor	0.89
Isentropic efficiency of each	0.99
Turbine	0.99
mechanical efficiency of each shaft	
combustion efficiency	
Combustion chamber pressure	6% compressor delivery
loss	pressure
Exhaust pressure loss	0.03bar
Ambient conditions, Pa, Ta	1bar, 288K

Q8 **Write all** **(2.5x4)**

a) Variable valve timing of engine

b) Dual fuel and multi fuel engines

c) Turbo Prop Vs Turbo Fan

d) Electronic Catalytic Converter Vs Conventional Exhaust Catalytic Converter