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Total Number of Pages: 02

B.Tech
PCME4302

5th Semester Regular / Back Examination 2016-17

I.C ENGINES AND GAS TURBINES

BRANCH: MECHANICAL

Time: 3 Hours

Max Marks: 70

Q.CODE: Y129

**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 are the basic requirements of a good SI engine combustion chamber?
- b) What is octane no? What is performance no?
- c) What is a Dual fuel engine and stratified engine?
- d) Which type of charge is necessary in idling condition and why?
- e) What is the effect of fuel air ratio and spark advance on NO_x emissions?
- f) What is the function of a thermostat and radiator?
- g) Which engine is more suitable for supercharging? SI engine or CI engine and why?
- h) Draw T-S diagram of a gas turbine cycle.
- i) What are the basic requirements of an ignition system?
- j) What are different types of lubrication system?

Q2 What are the assumptions taken in considering fuel air cycle? What are different losses calculated in fuel air cycle and actual cycle? Explain with p-v diagrams. **(2+8)**

Q3 a) With neat sketch describe the different types of fuel injection system? **(5)**

b) With neat sketch describe the modern ignition systems? **(5)**

Q4 a) With neat sketch describe the stages of combustion in CI engine? **(5)**

b) Describe the phenomenon of knocking in SI engine. On what factors do knocking depends? **(5)**

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Q5 a) What are the various methods of measurement of brake power? **(5)**

Describe with sketch how brake power is measured by Rope brake method?

b) Air enters the compressor of a gas turbine plant operating on brayton cycle at 101 kPa and 30 °C. The pressure ratio in the cycle is 8. Calculate the maximum temperature in the cycle and the cycle efficiency. Assume $W_T=2.5W_C$ where W_T and W_C are the turbine and compressor work respectively. $\gamma = 1.4$ **(5)**

Q6 a) What is valve timing diagram? Draw valve timing diagram for SI and CI engine? **(5)**

b) Compare the properties of LPG and gasoline as engine fuels. What are fuel additives? Name one antiknock additive used? **(5)**

Q7 An experimental four stroke petrol engine of 1710 cm³ capacity is to develop maximum power at 5400 revolutions per minute. The volumetric efficiency at this speed is assumed to be 70 per cent and the air fuel ratio is 13. Two carburettors are to be fitted and it is expected that at peak power the air speed at the choke will be 107m/s. The coefficient of discharge for the venture is assumed to be 0.85 and that of the main petrol jet is 0.66. An allowance should be made for the emulsion tube, the diameter of which can be taken as 1/2.5 of the choke diameter. The petrol surface is 6 mm below the choke at this engine condition. Calculate the sizes of a suitable choke and main jet. The specific gravity of petrol is 0.75. Atmospheric pressure and temperature 1.013 bar and 27° c respectively. **(10)**

Q8 Write short answer on any TWO: **(5 x 2)**

a) Turbo jet engine

b) Exhaust Gas Recirculation

c) Scavenging of two stroke engines

d) Evaporative cooling