PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 30   Max Time: 55 Mins   Weightage: 15 %   **Set A**

TEST 3

II Semester 2016-2017   Course: **ME A 204 IC Engines**   18 April 2017

Instructions:
   i.   Write legibly and draw free-hand sketches, wherever necessary
   ii. Scientific and non-programmable calculators are permitted

Part A

(3 Q x 3 M= 9 Marks)

1. What is octane number?

2. What are the emissions that come out of engine exhaust?

3. What is smog?

Part B

(2 Q x 6 M= 12 Marks)

4. Find out air-fuel ratio and the exhaust products when LPG (C_3H_8) is used as an engine fuel.

5. What are catalytic converters? How do they help in reducing HC, CO and NO_x emissions?

Part C

6. Explain the sources of hydrocarbon emissions from SI.   (5 marks)

7. Find out air-fuel ratio and the exhaust products for methanol (CH_4O) gas.   (4 marks)

Max Marks: 30   Max Time: 55 Mins   Weightage: 15 %   **Set A**

TEST 2

II Semester 2016-2017   Course: **ME A 204 IC Engines**   21 March 2017

Instructions:
   i.   Write legibly and draw free-hand sketches, wherever necessary
   ii. Scientific and non-programmable calculators are permitted

Part A

(3 Q x 3 M= 9 Marks)

1. What are the typical constituents of a heat balance sheet?
2. Briefly explain knocking in SI engines.
3. Mention any three methods to measure friction power.

Part B

(2 Q x 6 M= 12 Marks)

4. Draw the pressure versus crank-angle diagram for SI engines and list out the various stages of combustion.
5. A more test on a 2 cylinder, four stroke diesel engine gave the brake power measurements were as follows:
   With all cylinders   34.5 kW
   With cylinder No. 1 cut out   14.9 kW
   With cylinder No. 2 cut out   14.3 kW
   Estimate the indicated power of the engine.

Part C

(1 Q x 9 M= 9 Marks)

6. During the trial of a single-cylinder, 4 stroke oil engine using Prony braking system, the following results were obtained for one hour basis.

   - Cylinder diameter   --   20 cm
   - Stroke   --   40 cm
   - Mean effective pressure   = 6×10^5 N/m^2
   - Engine torque   =   407 Nm
   - Engine speed   --   250 rpm
   - Mass flow rate of oil   --   4 kg/h
   - Calorific value of fuel   =   43000 kJ /kg
   - Cooling water flow rate   =   270 kg/h
   - Flue gas flow rate   --   124 kg/h
   - Water inlet temperature to engine   = 15^0C
   - Water outlet temperature from engine = 60^0C
   - Temperature of exhaust gases   -- 420^0C
   - Room temperature   -- 20^0C
   - Specific heat of exhaust gas   =   1 kJ/kg K
   - Specific heat of water   =   4.18 kJ/kg K

   Calculate : (i) Indicated power (ii) Brake power and also draw up a heat balance sheet for the test in kJ/h basis

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Max Marks: 30   Max Time: 55 Mins   Weightage: 15 %   **Set A**

TEST 1

II Semester 2016-2017   Course: ME A 204 I C Engines   21 February 2017

Instructions:

    i.   Write legibly and draw free-hand sketches, wherever necessary

    ii.   Scientific and non-programmable calculators are permitted

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Part A

(3 Q x 3 M= 9 Marks)

1. List 3 differences between SI engines and CI engines
2. Define the following efficiencies:
   (i) Brake thermal efficiency (ii) Relative efficiency (iii) Mechanical efficiency
3. What is valve overlapping with respect to valve timing diagram?

Part B

(2 Q x 6 M= 12 Marks)

4. Explain with neat sketch the actual valve timing diagram of a 4 stroke CI Engine.

5. Single cylinder diesel engine develops 60 kW. Mass flow rate of fuel is 4.76×10^{-3} kg/s and calorific value of fuel is 42000kJ/kg. Mechanical efficiency and clearance volume of the engine is 80% and 98 cc respectively. The engine has a bore of 12 cm and stroke of 10 cm. Calculate (i)Swept volume (ii) Compression ratio (iii) Brake thermal efficiency (iv) Indicated power (v) Friction power

Part C

(1 Q x 9 M= 9 Marks)

6. Following data are available for a single cylinder four stroke petrol engine:
   - Brake power   =   75 kW
   - Engine rpm   =   400
   - Mechanical efficiency   =   80 %
   - Compression ratio   =   6.5
   - For air, γ =   1.4
   - Brake mean effective pressure=   8.4 bar
   - Specific fuel consumption   =   19.05 kg/h
   - Calorific value of fuel   =   44300 kJ /kg
   - Ratio of stroke to diameter   (L/d)   = 1

   Calculate : (i)air standard efficiency   (ii) brake thermal efficiency (iii) Indiacted power (iv) bore and stroke length