

BITS, PILANI-DUBAI CAMPUS, ACADEMIC CITY, DUBAI
FIRST SEMESTER 2008-2009

ME C441 AUTOMOTIVE VEHICLES

TEST 1

DATE: 09-10-08

DURATION: 50 MINUTES MAXIMUM MARKS: 25 WEIGHTAGE: 25%

1. A gas engine operating on the ideal Otto cycle has a compression ratio of 6:1. The pressure and temperature at the commencement of compression are 1 bar and 27°C. The heat added during the constant volume combustion process is 1170kJ/kg. Taking $C_v=0.718$ kJ/kg-K and $\gamma=1.4$ for air find the following.
 - i) The peak pressure and peak temperature
 - ii) Work output per kg of air
 - iii) The air standard efficiency.

6
2. Explain by means of suitable graphs the effect of dissociation on maximum temperature and brake power. How does the presence of CO affect dissociation?

5
3. Why the actual cycle efficiency is much lower than the air-standard cycle efficiency? List and explain the major losses in an actual engine. Give the typical values for the various losses compared to the air standard cycles.

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4. Explain how knocking takes place in diesel engines and discuss the various methods of controlling it. Compare the knocking in diesel engines with that of the petrol engines.

5
5. With a neat sketch explain the precombustion chamber used in CI engines. List out its merits and demerits of it compared to the direct Injection chambers.

4

BITS, PILANI-DUBAI CAMPUS, ACADEMIC CITY, DUBAI
SECOND SEMESTER 2008-2009

ME UC441 AUTOMOTIVE MECHANICS

TEST 2(OPEN BOOK)

DATE: 09-11-08

DURATION: 50 MINUTES

MAXIMUM MARKS: 20

WEIGHTAGE: 20%

(Only text book and Photostat of the printed material in the bound form signed by the instructor is allowed)

1. Determine the size of the fuel orifice to give a 13.5:1 air-fuel ratio, if the venturi throat has a 3 cm diameter and the pressure drop in the venturi is 6.5 cm Hg. The air temperature and pressure at carburetor entrance are 1 bar and 27 °C respectively. The fuel orifice is at the same level as that of the float chamber. Take density of gasoline as 740-kg/m³ and discharge coefficient as unity. Assume atmospheric pressure to be 76 cm of Hg and consider the compressibility of air. **5**

2. A six-cylinder four-stroke gasoline engine having a bore of 90mm and a stroke of 100mm has a compression ratio of 7. The relative efficiency based on the indicated power is 55%. When the ISFC is 300gm/kW-h estimate the calorific value of the fuel and the Total Fuel Consumption given the indicated mean effective pressure is 8.5 bar and the speed of the engine is 2500 rpm. **5**

3. Discuss the construction of different types of radiator cores with simple sketches. What do you mean by radiator boiling and how it is overcome? **4**

4. With a cross section of a Jerk type fuel injection pump and diagrams with various plunger positions explain the actual method of controlling the quantity of fuel injected in a CI engine. **4**

5. What for willan's line method is used. Explain the draw backs of it. **2**

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**BITS, PILANI-DUBAI, ACADEMIC CITY, DUBAI
FIRST SEMESTER 2008-2009**

**ME UC441 AUTOMOTIVE MECHANICS
QUIZ 1**

(24-09-08)

DURATION: 15 MINUTES MAXIMUM MARKS: 5 WEIGHTAGE: 5%

1. Define delay period in diesel engines.
2. What do you mean by exhaust blow-down? What is the advantage of it?
3. How does the explosion ratio and cut off ratio affect the efficiency in case of dual cycle?
4. How does the variable specific heat affect fuel air cycles?
5. Differentiate between direct and indirect injection chambers in case of diesel engines.



BITS, PILANI-DUBAI, ACADEMIC CITY, DUBAI
FIRST SEMESTER 2008-2009

ME C441 AUTOMOTIVE VEHICLES

QUIZ 2

DURATION: 15 MINUTES MAXIMUM MARKS: 5 WEIGHTAGE: 5%
29-10-08

Name of the student: -----

Id.: -----

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1. State the expression to determine the mass flow rate of air flowing through the carburetor considering the compressibility of air in terms of inlet and throat conditions of air.
 2. What is the purpose of a control rack in case of a jerk type fuel injection pump used in a diesel engine?
 3. Explain the difference between the pintle and pintaux types of nozzles used in the diesel injection systems.
 4. Explain the purpose of thermostat used in the engine cooling system.
 5. Explain what you mean by mist lubrication system.

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BITS, PILANI-DUBAI, ACADEMIC CITY, DUBAI
FIRST SEMESTER 2008-2009

ME C441 AUTOMOTIVE VEHICLES

QUIZ 3

DURATION: 15 MINUTES MAXIMUM MARKS: 10 WEIGHTAGE: 5%

~~26-11-08~~

Name of the student: ----- ~~29-11~~ Id.: -----

1. List out the advantages of the fluid flywheel clutches.
2. When a car is running on a level road the tractive effort on the driving wheels is 500 N. If the diameter of the wheel is 1 m and the final drive ratio is 2 & the gear box ratio is 1.25 find the torque developed by the engine.
3. Explain what you mean by double declutching.
4. In a simple epicyclic gear train if the number of teeth on the ring gear is 120 and the no of teeth on the plane gears is 30 and the no of teeth on the sun gear is 60 find the first gear and reverse gear ratios.
5. In a typical hydromatic transmission system explain how the top gear ratio (gear ratio =1) and the first gear ratio (max speed reduction) is obtained.

COMPREHENSIVE EXAMINATION

DATE: 24-12-08

DURATION: 3 Hrs. MAXIMUM MARKS: 40 WEIGHTAGE: 40%

1. From the point of view of fuel air cycle analysis how does fuel air ratio affect efficiency, maximum power, temperature and pressure in a cycle? Discuss with suitable graphs. **4**
2. There is a saying that a good SI engine fuel automatically becomes a bad CI engine fuel. Consolidate the statement with suitable facts and discussions with respect to engine working, nature of combustion and knocking **4**
3. The venturi of a simple carburetor has a throat diameter of 25 mm and the coefficient of flow for air is 0.8. The fuel orifice has a diameter of 1.2 mm and coefficient of fuel flow is 0.65. The gasoline surface is 7mm below the throat, neglecting the compressibility of air calculate
a. the air-fuel ratio for a pressure drop of 0.1 bar when the nozzle tip is neglected.
b. the air-fuel ratio when the nozzle tip is taken in to account.
c. The minimum velocity of air or the critical air velocity required to start the fuel flow when the nozzle tip is provided.
Assume the density of air and fuel to be 1.2 kg/m^3 and 750 kg/m^3 respectively. **5**
4. A test on a single cylinder 4 stroke oil engine having bore of 180 mm and stroke of 360 mm gave the following results.
Speed = 350 rpm, brake torque = 390 N-m, IMEP = 7.2 bar, oil consumption = 3.5 kg/h, coolant flow = 270 kg/h, cooling water temperature rise = 36°C , air-fuel ratio by weight = 25, exhaust gas temperature = 500°C , room temperature = 21°C . The fuel has a calorific value 45200 kJ/kg and taking specific heat of the exhaust gases as 1.0035 kJ/kg-K and specific heat of water as 4.18kJ/kg-K, calculate
a. Indicated thermal efficiency,
b. Draw up a heat balance sheet in kW basis. **6**
5. Make a neat sketch showing the components of a dry sump method of engine lubrication. Explain its working. **4**
6. With suitable sketches explain the working of constant mesh type gearbox. How different gear ratios are obtained in it? **4**
7. Differentiate clearly the functions of a spring and a shock absorber. Explain the construction and working of a telescopic shock absorber with the help of a neat diagram. **4**
8. Explain the terms castor, camber and kingpin inclination. What are the effects of each on the steering characteristics of a vehicle? **4**
9. A motor car has a wheel base of 3m, the height of its CG above the ground level is 0.7m and it is 1.25m front of the rear axle. If the car is traveling at the speed of 60km/hr on a level track determine the minimum distance the car may be stopped when a. the rear wheels are only braked, b. only the front wheels are braked, c. all the wheels are braked. The coefficient of friction between the tyre and road may be taken as 0.6 **5**
