

BITS, PILANI-DUBAI , ACADEMIC CITY, DUBAI  
SECOND SEMESTER 2007-2008

ME UC441 AUTOMOTIVE VEHICLES

**COMPREHENSIVE EXAMINATION**

DATE: 27-05-08

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

1. In an air standard diesel cycle, the compression ratio is 15. Compression begins at 1 bar, 27°C. The heat added is 1.750 MJ/kg. Find the maximum temperature, maximum pressure of the cycle, the thermal efficiency of the cycle and the mean effective pressure of the cycle. 6
2. What is the purpose of additives in lubricating oil? Explain the different types of additives used in automobile. 4
3. The venturi of a simple carburetor has a throat diameter of 30 mm and the coefficient of flow is 0.8. The fuel orifice has a diameter of 1.5 mm and coefficient of fuel flow is 0.65. The gasoline surface is 5mm 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.Assume the density of air and fuel to be 1.2 kg/m<sup>3</sup> and 750 kg/m<sup>3</sup> respectively. 6
4. Explain the four stages of combustion in a diesel engine with a P-θ diagram. 4
5. Explain the effects of **time loss factor** and **heat loss factor** with suitable graphs on the performance of actual I.C.Engines. 4
6. With a neat diagram explain the working of a single plate clutch. 4
7. Discuss the Ackerman steering system with a simple sketch and derive an expression for the true rolling motion in it. 4
8. Explain the construction and working of synchromesh type gear engagement with a sketch and list its advantages. 4
9. Draw a simple diagram to show the layout of a hydraulically operated four wheel brake system and explain its working in detail. 4

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ME UC441 AUTOMOTIVE VEHICLES  
**TEST 2 (Open Book)\***

DATE: 04-05-08

**DURATION: 50 MINUTES    MAXIMUM MARKS: 20    WEIGHTAGE: 20%**

\*Only prescribed textbook, bound Xeroxed copy of the reference book duly signed by the instructor and hand written notes are allowed

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- Why fins and baffles are required in air cooled engine? Explain. What are the limitations of air cooling? **3**
2. Explain the pressure lubrication system used in automobiles with a neat sketch. How the various engine components are lubricated in this. **4**
3. A 4 cylinder 4 stroke SI engine has compression ratio of 6 to 1. A test on the engine gave the following data  
Net brake load – 20kg, brake arm-0.5m, imep-6bar, engine speed-2500rpm, fuel consumption-10kg/h, calorific value of the fuel-45000kJ/kg, cylinder bore - 86mm, stroke-~~10mm~~ 100 mm.  
Calculate i) the mechanical efficiency ii) brake thermal efficiency iii) bmep **6**
4. Explain the purpose of the clutch in an automobile. How the clutches are classified. **3**
5. With suitable sketches explain the working of constant mesh type gearbox. How different gear ratios are obtained in it? **4**

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ME UC441 AUTOMOTIVE VEHICLES  
**TEST 1**

DATE: 23-03-08

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

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- Explain the working of the diesel cycle with P-V and T-S diagrams and derive an expression for the air standard efficiency of the cycle in terms of compression ratio and cutoff ratio. **4**
2. Differentiate between a valve and a port with respect to construction and operation. **3**
3. How do the specific heats vary with temperature? Explain with the help of a P-V diagram the loss due to variation of specific heats in a fuel – air Otto cycle. **3**
4. The venturi of a simple carburetor has a throat diameter of 20 mm and the coefficient of flow is 0.8. The fuel orifice has a diameter of 1.14 mm and coefficient of fuel flow is 0.65. The gasoline surface is 5mm below the throat, neglecting the compressibility of air calculate
- the air-fuel ratio for a pressure drop of 0.08 bar when the nozzle tip is neglected.
  - the air-fuel ratio when the nozzle tip is taken in to account.
- Assume the density of air and fuel to be  $1.2 \text{ kg/m}^3$  and  $750 \text{ kg/m}^3$  respectively. **6**
5. Explain “knocking” in SI engines and discuss the various engine factors which affect it. **5**
6. What is the purpose of a governor in a CI engine? Explain the working of a mechanical governor with a simple sketch. **4**

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