

**COMPREHENSIVE EXAMINATION**

DATE: 03-06-12

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

Answer all the questions

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1. What do you mean by exhaust blow down? Discuss the optimum opening position of exhaust valve to reduce the exhaust blow down loss. **4**
  2. Differentiate between the direct and indirect combustion chambers for diesel engines and discuss the relative advantages. Explain the features of a pre combustion chamber with a simple sketch. **5**
  3. A single jet carburetor has to supply 8 kg/min. of air and 0.6 kg/min. of petrol of specific gravity 0.8. The air is initially at 1 bar and 27 °C. Assuming an isentropic coefficient of 1.35 for air ,  $C_p$  for air = 1.005 kJ/kg-K  $R$  for air = 0.287 kJ/kg-K and considering the compressibility of air determine
    - a. the diameter of the venturi if the air speed is 90 m/sec and the velocity coefficient of air for venturi is 0.85
    - b. the diameter of the fuel jet if the pressure drop at the fuel jet is 0.8 times the pressure drop at the venturi for air and the coefficient of discharge for the fuel jet is 0.6. **6**
  4. A test on a 6 cylinder 4 stroke petrol engine gave the following readings. Cylinder dia = 10cm , stroke=12cm, speed of the engine=5000rpm, load on the brake drum= 30kg, brake drum diameter=36cm, compression ratio=8, duration of the test=15 min, fuel consumed during the test period=4kg, calorific value of the fuel=47000kJ/kg, ambient conditions = 27°C and 1 bar, amount of air consumed=5kg/min. Determine the following a. BMEP b. BSFC and BSAC c. brake thermal efficiency d. volumetric efficiency. **6**
  5. A motor car engine develops 5.9kW at 2100 rpm. Find the suitable size of the clutch plate having friction linings riveted on both sides to transmit the power under the following conditions. Intensity of the pressure not to exceed  $6.87 \times 10^4$  Pa, slip torque and losses due to wear is 35% of engine torque, coefficient of friction on contact surface is 0.3 and inside diameter of the friction plate is 0.55 times the outside diameter. **4**
  6. 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 down in a slope of  $10^\circ$  at the speed of 50km/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 **4**
  7. What is the need for shock absorber? List out the different types used in an automobile. Explain the working of a hydraulic shock absorber with a neat sketch. **5**
  8. With the tractive effort versus total resistance curves explain the necessity of a gear box. Explain the working of a constant mesh gear box with simple sketch. What is double de clutching? **6**

ME C441 AUTOMOTIVE VEHICLES  
**TEST 2 (Open Book)\***

DATE: 8-05-11

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

\*Only prescribed textbook and hand written notes are allowed

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1. What do you mean by center point steering? Define castor angle and king pin inclination. Why they are provided in the vehicle. **4**
  
  2. A plate clutch has three discs on the driving shaft and two discs on the driven shaft providing four pairs of contact surfaces. The outside diameter of the contact surfaces are 30 cm and the inside diameter 15cm. Assuming uniform pressure and  $\mu=0.3$  find the total spring load pressing the plates together to transmit 25kW at 1500rpm. There are 6 springs each of stiffness 15kN/m and each of the contact surface has worn by 0.5 mm, find the maximum power that can be transmitted assuming uniform wear. **5**
  
  3. The engine of a car produces a power 70 kW at a speed of 3000rpm. In the manual type gear box which is running at a low gear, the clutch shaft pinion has 19 teeth and low gear main shaft pinion has 36 teeth. The corresponding lay shaft pinions have 38 and 18 teeth. The final drive ratio is 4:1 and the effective radius of the rear tyre is 0.375 m. Calculate the car speed (km/hour) in the above arrangement and the Tractive effort at the driving wheels. **4**
  
  4. What is slip and % slip in fluid coupling? Explain how it varies with the input speed with a suitable graph. State the limitations of fluid coupling. **3**
  
  5. Find the percentage change in the efficiency of an Otto cycle having a compression ratio of 8, if  $C_v$  increases by 15%. Derive the equation used. **4**
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**BITS, PILANI-DUBAI, ACADEMIC CITY, DUBAI**  
**SECOND SEMESTER 2011-2012**  
**ME C441 AUTOMOTIVE VEHICLES**

**TEST 1**

**DATE: 29-02-12**

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

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1. Explain the different types of brake shoe arrangements in drum brake system. **4**
  
  2. 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 down at the speed of 60km/hr on a slope of 25deg, 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 **6**
  
  3. How does ALBS in automobile work? Explain the different types of ALBS currently employed in the automobile industry. **5**
  
  3. Discuss the different types of leaf springs used in automobiles with simple sketches. Discuss their construction and applications. **5**
  
  4. 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. **5**







