Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER MAKE-UP EXAMINATIONS, JUNE 2018

SUBJECT: DESIGN OF IC ENGINES [AAE 4020]

REVISED CREDIT SYSTEM
(22/ 06 / 2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- Permitted to use design data handbook.

1A. Write the differences between Dry liner and wet liner. **(02)**

1B. A four stroke diesel engine has the following specification: break power= 8 kW, speed= 1500 rpm, indicated mean effective pressure= 0.4 N/mm^2, maximum pressure= 3.5 N/mm^2 , mechanical efficiency=80%. If the cylinder is made of cast iron, determine the dimensions of engine cylinder, longitudinal stress, and circumferential stress. **(08)**

2A. List the different methods to prevent piston seizure. **(03)**

2B. The four-stroke diesel engine has Cast iron piston with cylinder bore of 250 mm, maximum gas pressure of 4 N/mm^2, allowable bearing pressure at small end of connecting rod = 15 N/mm^2, length of the piston pin is 0.45 times the bore diameter, ratio of inner to outer diameter of piston pin is 0.6, allowable bending stress for the piston pin is 84 N/mm^2. Calculate thickness of piston crown, outer diameter of piston pin, inner diameter of piston pin and check the design for bending stresses. **(07)**

3A. Define whipping stress on connecting rod. **(02)**

3B. The following data is given for connecting rod: engine speed =1800 rpm, length of connecting rod = 350 mm, length of stroke = 175 mm, density of material = 7800 kg/m^3, thickness of web or flanges = 8 mm, area of cross-section = 11t^2, moment of inertia along X axis = (419 / 12) t^4 and y = (5t / 2). Calculate the whipping stress in the connecting rod. **(03)**

3C. The connecting rod of Diesel engine has symmetrical H section has following details: - thickness of web is 20 mm, height of web is 30mm, width of flanges is 60 mm and thickness of flanges is 20 mm. Calculate the moment of inertial of section along X and Y axis using parallel axis theorem. **(05)**

4A. Draw a neat labelled sketch of side valve actuating mechanism. **(02)**

4B. The valve gear mechanism for a horizontal diesel engine for the following data: Bore = 140 mm; Stroke = 270 mm; Power = 8.25 kW; Speed = 475 r.p.m; Maximum gas pressure = 3.5 N/mm^2 The valve opens 33° before outer dead center and closes 1° after inner dead center. It opens and closes with constant acceleration and deceleration for each half of the lift. The length of the rocker arm on either side of the fulcrum is 150 mm and the included angle is 160°. The weight of the valve is 3 N. Determine thickness of the valve head, stem diameter and maximum lift of the valve. **(03)**

4C. Design a side or overhung crankshaft for a 250 mm × 300 mm gas engine. The weight of the flywheel is 30 kN and the explosion pressure is 2.1 N/mm^2. The gas pressure at the maximum torque is 0.9 N/mm^2, when the crank angle is 35° from I. D. C. The connecting rod is 4.5 times the crank radius. **(05)**

5A. Write the functions of flywheel in I.C engine. **(02)**

5B. The turning moment diagram for a petrol engine is drawn to the following scales: Turning moment, 1 mm = 5 N-m; Crank angle, 1 mm = 1°. The turning moment diagram repeats itself at every half revolution of the engine and the areas above and below the mean turning moment line, taken in order are 295, 685, 40, 340, 960, 270 mm^2. Determine the mass of 300 mm diameter flywheel rim when the coefficient of fluctuation of speed is 0.3% and the engine runs at 1800 r.p.m. Also determine the cross-section of the rim when the width of the rim is twice of thickness. Assume density of rim material as 7250 kg / m3. **(08)**