Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

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A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)
MAKEUP EXAMINATIONS, JUN/JULY 2017
SUBJECT: DESIGN OF IC ENGINES [AAE 4020]
REVISED CREDIT SYSTEM
(22/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. Why the dry liners should be machined on inner and outer surface. **(02)**

1B. A four stroke diesel engine has the following specification: Break power= 7.5 KW, speed= 1400rpm, indicated mean effective pressure= 0.35 N/mm^2, maximum pressure= 3.5 N/mm^2 , mechanical efficiency=80%. If the cylinder is made of cast iron, determine the cylinder dimensions. **(08)**

2A. Write the different types of pistons which avoids the Piston seizure. **(03)**

2B. Following data have been obtained based on heat, speed characteristic and dynamic analysis of carburetor engine: bore diameter= 80 mm, stroke= 80 mm, max combustion pressure= 6.2MPa, engine speed=3200rpm, max thrust on cylinder wall 0.0045MN at 370°, reciprocating mass= 0.48kg, idling speed=6000 rpm, R/L= 0.285. Design the Piston. **(07)**

3A. List the different types of crankshaft. **(02)**

3B. The following information is related to carburetor engine: bore = 80mm, stroke = 80 mm, ratio of crank radius to Connecting Rod length = 0.258, mass of Piston group = 0.48 kg, Mass of connecting rod assembly = 0.72 kg, mass of crank rotation = 0.68 kg, inertia force of balancing weight = 10000N, engine speed in Idling = 6000rpm. The table gives maximum and minimum of forces F_t and F_R in column 2 and 3 as function of crank angle θ at 5600 rpm: **(08)**

Θ in °	Tangential force F_t (N)	Radial force F_R (N)	$F_R + K_{Rcr}$	R_{cp}	$F_R + K_{Rcr} + K_{Rc}$
0	0	-12103	-19283	1928	-28637
30	-6025	-7660	-14840	16016	-24194
:	:	:	:	:	:
370	3387	14897	7717	8427	-1637
450	6322	-1864	-9044	11037	-18398

4A. Write the components of Valve actuating mechanisms **(02)**

4B. Design the various components of the valve gear mechanism for horizontal diesel engine for the following data: Bore = 140 mm, stroke = 270 mm, power 8.25 kW, speed = 475 rpm, maximum gas pressure = 3.5 N/mm^2. **(08)**

The valve opens 33° before outer dead centre and closes 1° after inner dead centre. 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 3N. take mean velocity of gas through port = 40 m/s, $\alpha = 45°$, k = 0.42, σ_b = 56 MPa, p_c = 0.4 N/mm^2, p_s = 0.025 N/mm^2.

5A. Write the functions of Flywheel and mention its types. **(02)**

5B. Design a connecting rod for a single cylinder four stroke Diesel engine from the following specifications: - bore of the cylinder = 90mm, stroke = 150mm, engine speed= 1500 rpm, compression ratio = 16, maximum gas pressure up to 7% of the stroke = 4.5 MPa, length of the Connecting rod between centers = 350mm, weight of the reciprocating parts = 30 N. If the connecting rod is choosing to be I section, its web thickness considered to be “t” and height of “20t”. top flange of width “16t” and thickness of “1.2t”. bottom flange of width “24t” and thickness of “1.2t”. **(08)**