



# CBCS SCHEME

18MEA252

## Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020 Automobile System Design

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Assume any missing data suitably.  
3. Use Design Data Handbook – Mahadevan and Balveer Reddy.

### Module-1

- 1 a. What are the functional requirements of injection system? (05 Marks)  
b. Sketch and explain various phases of spray Formation. (10 Marks)  
c. Write a brief note on drag forces acting on cars? (05 Marks)

OR

- 2 a. Sketch and explain Fuel Feed System for CI engine. (08 Marks)  
b. List and explain the major components of an Automobile. (06 Marks)  
c. A six cylinder, four stroke diesel engine develops 125kW at 3000rpm. Its brake specific fuel consumption is 200gm/kwh. Calculate the quantity of fuel to be injected per cycle per cylinder. Specific gravity of fuel may be taken as 0.85. (06 Marks)

### Module-2

- 3 a. Briefly describe cylinder liners. (05 Marks)  
b. Determine the thickness of cast Iron cylinder wall and the stress for a 300mm petrol engine with a maximum gas pressure of 3.5 N/mm<sup>2</sup>. (15 Marks)

OR

- 4 a. Briefly describe cylinder lubrication. (05 Marks)  
b. A vertical four stroke compression ignition engine has following specification.  
Brake Power = 4.5kW  
Speed = 1200 rev/min  
B.m.e.p = 0.35N/mm<sup>2</sup>  
Indicated power = 0.80  
Determine dimensions of the cylinder. (15 Marks)

### Module-3

- 5 Design a cast Iron for single acting four stroke engine following specification:  
cylinder bore = 100mm  
Stroke = 120mm  
Maximum gas pressure = 5 N/mm<sup>2</sup>  
Brake mean effective pressure = 0.65N/mm<sup>2</sup>  
Fuel consumption = 0.227 kg/kw/hr  
Speed = 2200 rev/min  
Assume suitable data. (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 Design an overhung crankshaft with 2 main bearing and a flywheel in between them for IC engine, single cylinder  $0.25\text{m} \times 0.30\text{m}$ . Flywheel weighs  $27\text{kN}$ . The maximum pressure is  $2.1\text{MPa}$ . The torsional moment is maximum when the crank is at  $35^\circ$  from I.D.C while the pressure is  $1.05\text{MPa}$ . Assume missing data. (20 Marks)

Module-4

- 7 a. Classify and explain the types of suspension springs? (10 Marks)  
 b. Define Resonance, Isolation, Forced vibration, Time period, Degree of Freedom. (05Marks)  
 c. Obtain two degree of freedom equation of motion for vehicle suspension. (05Marks)

OR

- 8 a. Briefly explain any 2 types of gearbox. (08 Marks)  
 b. The maximum gearbox ratio of an engine  $75\text{mm}$  bore and  $100\text{mm}$  stroke is '4'. The pitch diameter of constantly meshing gear is  $75\%$  of piston stroke. If the module is  $4.25\text{mm}$ . Calculate the size and number of teeth of gears for three speed gearbox. Calculate the face width of constantly meshing gear using modified Lewi's formula. The engine torque is  $910\text{kgf.cm}$  value of constant Lewi's formula is  $0.07$  and allowable stress is  $900\text{kgf/cm}^2$ . Draw the neat sketch of three speed gear layout. (12 Marks)

Module-5

- 9 Explain briefly :  
 a. Engine coolant flow. (05 Marks)  
 b. Forced circulation water cooling system (05 Marks)  
 c. Radiator (05 Marks)  
 d. Purpose of cooling system. (05 Marks)

OR

- 10 a. Write the advantages and disadvantages of liquid cooled engine system. (08 Marks)  
 b. Explain modes of heat transfer. (06 Marks)  
 c. Briefly explain measurement of emissions. (06 Marks)

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