TED (15) 5051 Reg. No.....

(REVISION 2015) Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

AUTOMOBILE DESIGN

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Name any two inversions of a double slider crank chain.
2. What types of stresses are induced in shafts ?
3. Write down the condition for maximum tension in the belt.
4. State the main function of a piston.
5. What do you understand by gear train ? (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Differentiate between a machine and a structure.
2. List the different types of sunk keys.
3. Discuss the merits of chain drive for power transmission.
4. Illustrate a multiplate clutch and mark various parts.
5. Mention some of the forces acting on the connecting rod.
6. Write the different types of motion with which a follower can move.
7. Discuss the advantages of gear drive. (5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — 1

III (a) Write short notes on the classifications of machine design. 8

(b) Mention the names of any seven types of kinematic pairs. 7

OR

Marks

IV (a) Write the purpose of thrust bearings ? Give their types definitions in brief. 8

(b) A line shaft rotating at 300 rpm is to transmit 32 kW. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42 MPa. Determine the diameter of the shaft, neglecting the bending moment on the shaft. 7

UNIT — II

V (a) Define keyway. State the effect of keyway cut into a shaft. 7

(b) Design a muff coupling which is used to connect two steel shafts of diameter 55 mm. The shafts transmit a power of 40 kW at 350 r.p.m. The material for the shaft and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for muff is cast iron with an allowable shear stress of 15 MPa. 8

OR

VI (a) A casting weighing 9 kN hangs freely from a rope which makes 2.5 turns round a drum of 300 mm diameter revolving at 30 r.p.m. The other end of the rope is pulled by a man. The co-efficient of friction is 0.25. Determine the force required by the man and power to raise the casting. 8

(b) Briefly discuss the slip and creep related with belts. 7

UNIT — III

VII (a) Explain the design considerations for a friction clutch. 7

(b) A multiple disc clutch has five plates having four pairs of active friction surfaces. The intensity of pressure is not to exceed 0.153 N/mm^2. Find the power transmitted at 450 r.p.m. The outer and inner radius of friction surfaces are 130 mm and 85 mm respectively. Assume uniform wear theory and take μ as 0.3. 8

OR

VIII (a) Express in words the function of the following parts of an I.C. engine piston.

(i) Head (ii) Skirt (iii) Piston pin (iv) Piston rings. 7

(b) Design the crown part of a piston for a four stoke engine for the following data. Bore = 100 mm, stroke = 125 mm, maximum gas pressure = 5 N/mm^2. Imep = 0.75 N/mm^2, Mechanical efficiency = 80%, b.s.f.c. = 0.15 kg/brake power/hr., calorific value = 42 MJ/kg, speed = 2000 r.p.m. 8

UNIT — IV

IX (a) Explain how followers are classified according to the surface in contact. 7

(b) A cam is to be designed for a knife edge follower with the following data. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion. Dwell for the next 30°. The follower returns with simple harmonic motion for next 60°. Dwell during remaining 180°. The radius of the base circle of the cam is 40 mm. Draw the profile of the cam when the line of stroke of the follower passes through the axis of the camshaft. 8

OR

X (a) Write any ten terminology used to describe a gear. 8

(b) Explain with a neat sketch the reverted gear train. 7