Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: DESIGN OF MACHINE ELEMENTS (AAE 2252)

REVISED CREDIT SYSTEM
(24/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data **IF ANY**, may be suitably assumed and mentioned clearly

1A. Write a short note on Belt drives. Differentiate between its types. **(05)**

1B. With a neat sketch show that spring index for both the springs are same in concentric spring systems. **(05)**

2A. It is required to transmit 15 kW power from a shaft running at 1200 rpm to a parallel shaft with a velocity ratio of 3. The centre distance of shafts is to be 300 mm. The material used for pinion is steel (σ= 200 MPa) and for gear is cast iron (σ= 140 MPa). The service factor is 1.25 and the tooth profile is 20° full depth involute. Design the spur gear and calculate the gear parameters. **(05)**

2B. For the above gear pair, check the design for safety and mention remedial measures, if any. **(05)**

3A. Design a helical compression spring to sustain an axial load that fluctuates between 1.5 kN and 2 kN with an associated deflection of 15 mm during load fluctuation. **(05)**

3B. Design a journal bearing for a centrifugal pump from the following data: Load on the journal = 10 kN, speed of the journal = 900 rpm, ambient temperature = 15°C, temperature of oil = 80°C, viscosity of oil = 32 cP **(05)**

4A. Briefly explain the bearing characteristic number. With a neat sketch explain the classification of lubrication regimes. **(05)**

4B. A single row deep groove ball bearing is to carry a radial load of 2.5 kN and a thrust load of 1.5 kN. The service imposes light shock and the bearing is to operate 40 hours per week for 4 years. The speed of the shaft is 900 rpm. Design the bearing and mention the SKF bearing number. **(05)**

5A. 2 shafts at right angles are connected with a pair of bevel gears having 14.5° composite tooth form. The pinion is made of steel (σ= 120 MPa) and the gear is to be made of cast iron (σ= 80 MPa). The pinion having 26 teeth is to transmit 10 Kw at 1200 rpm. The velocity ratio is 2.5. Design the gear pair and find the gear parameters. **(05)**

5B. For the above gear pair check the design for safety, if the gears are to be heat treated to 300 BHN. **(05)**