

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017**Eighth Semester**

Branch : Mechanical Engineering

AU 010 801/ME 010 801—DESIGN OF TRANSMISSION ELEMENTS—(AU, ME)

(New Scheme—2011 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

*Answer any two questions each from Part A and Part B.**Each question carries 25 marks.**Assume missing data suitably.**Machine Design Databook as per syllabus is permitted.***Part A (Module 1 and 2)**

1. A plate clutch having a single driving plate with contact surfaces on each side required to transmit 110 kW at 1250 r.p.m. The outer diameter of the contact surface is to be 300 mm. The coefficient of friction is 0.4 :
 - (a) Assuming a uniform pressure of 0.17 N/mm^2 , determine the inner diameter of the friction surface.
 - (b) Assuming the same dimension and same total axial thrust, determine the maximum torque that can be transmitted and the maximum intensity of pressure when uniform wear condition have been reached.
2. A rope drum of an elevator having 650 mm diameter is fitted with a brake drum of 1 m diameter. The brake drum is provided with four cast iron brake shoes each subtending an angle of 45° . The mass of the elevator when loaded is 2000 kg and moves with a speed of 2.5 m/s. The brake has a sufficient capacity to stop the elevator in 2.75 metres. Assuming the coefficient of friction between the brake drum and shoe as 0.25, find :
 - (i) Width of the shoe, if the allowable pressure on the brake shoe is limited to 0.3 N/mm^2 .
 - (ii) Heat generated in stopping the elevator.
3. Design a journal bearing for a centrifugal pump for the following data :

Load on the journal = 12 kN ; Diameter of the journal = 75 mm ; Speed = 1440 r.p.m. ; Atmospheric temperature of oil = 16°C ; Operating temperature of the oil = 60°C ; Absolute viscosity of the oil at 60°C is 23 centipoise. Give a systematic design of the bearing.

Turn over

4. A single row deep groove ball bearing operating at 2000 r.p.m. is acted by a 10 kN radial load and 8 kN thrust load. The bearing is subjected to a light shock load and the outer ring is rotating. Determine the rating life of the bearing.

(2 × 25 = 50 marks)

Part B (Module 3 and 4)

5. An electric motor is to be connected to a reciprocating pump through a gear pair. The gears are overhanging in their shafts. Motor speed = 1440 r.p.m. ; Speed reduction ratio = 5 ; Motor power = 36.8 kW ; The gears are to have 20° pressure angle. Design a suitable spur gear drive.
6. Design a worm gear drive with a standard centre distance to transmit 7.5 kW from a worm rotating at 1440 r.p.m. to a worm wheel at 20 r.p.m.
7. Design a cast iron piston for a single acting four stroke engine for the following data :

Cylinder bore	=	100 mm
Stroke	=	125 mm
Maximum gas pressure	=	5 N/mm ²
Indicated mean effective pressure	=	0.75 N/mm ²
Mechanical efficiency	=	80%
Fuel consumption	=	0.15 kg/brake power/hour
Higher calorific value of fuel	=	42 × 10 ³ kJ/kg
Speed	=	2000 r.p.m.

8. (a) Explain the design recommendation for :
- (i) Forged components. (ii) Welded section.
- (b) Explain the preparation of working drawings for manufacture of parts with complete specification.

(2 × 25 = 50 marks)

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Mechanical Engineering/Automobile Engineering

ME 010 801/AU 010 801—DESIGN OF TRANSMISSION ELEMENTS (AU, ME)

(2010 Admissions—Supplementary)

Time : Three Hours

Maximum : 100 Marks

Answer one full question from each module.

Missing data can be assumed with proper justification.

Use of design data book is permitted.

Each full question carries 25 marks

Module I

1. A cone clutch is to be used for transmitting torque of 300 N. cm. The mean diameter is 25 cm and the semi cone angle 12° . $\mu = 0.25$, and the normal pressure at mean radius must not exceed 1.4 kg/cm^2 . Calculate the necessary width of contact surface. Assume pressure intensity uniform. Also find the axial force need to hold the clutch surface together.

Or

2. A band and block brake having 12 blocks each subtending an angle of 14° at the centre is applied to a rotating drum having 105 cm diameter. The blocks are 5 cm thick. The two ends of the band are attached to pins on opposite sides of the brake lever at a distances of 2 cm and 8 cm from the fulcrum. What is the minimum force required to be applied at the end of a lever one meter long for the brake to absorb 280 kw at 250 rpm ? μ between block and drum is 0.35.

Module II

3. (a) Write briefly on Bearing Materials.

(5 marks)

- (b) The load on the Journal bearing is 150 kN due to Turbine shaft of 300 mm diameter running at 1800 rpm. Determine the following :

- (i) Length of bearing, if the bearing pressure is 1.6 N/mm^2 and

- (ii) Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60°C and viscosity of oil at 60°C is 0.02 kg/m-s and the bearing clearance is 0.25 mm.

(20 marks)

Or

Turn over

4. (a) Discuss the advantages and disadvantages of rolling contact bearing. (5 marks)
- (b) Select a suitable single row radial ball bearing to carry a radial load of 150 kg and a thrust load of 120 kg at 900 RPM. The bearing is to be used 7 hours per day and average service life of 8 years is desired. (20 marks)

Module III

5. (a) Explain the term, formative number of teeth on a Gear. (5 marks)
- (b) Design a Spur Gear and a Pinion Drive to transmit 40 kw from a motor shaft running at 1440 rpm to another shaft with a speed reduction of 8:1. Both the pinion and gear are made of hardened steel for which safe static stress may be taken as 21 kg/mm^2 . The $14\frac{1}{2}$ pinion has 24 teeth of 4 mm module.

Or

6. (a) State Lewis equation :
- (i) Why Helical gear transmits more power at higher speeds compared with spur gear. (5 marks)
- (b) A parallel Helical cast steel gear with 30° helix angle has to transmit 45 kw at 2000 rpm. Find the module, pitch diameter and width for 20° involute full depth teeth. The gear has 25 teeth. The static stress for cast steel is 1000 kg/cm^2 . (20 marks)

Module IV

7. Discuss the general design recommendations of parts produced on milling machines.
- Or
8. Design a trunk type cast iron piston for a single cylinder four stroke diesel engine running at 450 RPM. The other particulars are as follows :

Cylinder bore	= 24 cm.
Stroke	= 30 cm.
Brake mean effective Pressure	= 8 kg/cm^2 .
Max Gas Pressure	= 50 kg/cm^2 .
Fuel Consumption	= 0.18 kg/BHP per hour
HCV of fuel	= 4600 kJ/kg.

(4 × 25 = 100 marks)

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Mechanical Engineering/Production Engineering

PE 010 805 G01/ME 010 805 G01—INDUSTRIAL SAFETY (Elective IV) (ME, PE)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. What is the need of Safety in an Industry ?
2. Why Safety training and Education is important ?
3. What is the role of Government in Safety in an Industry ?
4. How the house keeping relates to Safety in an Industry ?
5. What you understand by "Fire Load" ?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain the role of qualified trained professionals in an Industry .
7. Explain how one Accident can damage the economic growth of an Industry .
8. Write note on "Incident recall Technique".
9. Make comment on Occupational Health and Hygiene ?
10. Explain the various Fire Detection methods in an Industry.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. Explain, Planning for Safety, Planning Procedure and Formulation of Safety Policy and also the Safety budget.

Or

Turn over

12. Explain the need types and functions of a Safety Committee.
13. Explain the Domino theory and Accident Prevention Methods.

Or

14. Explain :

(a) Safety Education and Training.

(6 marks)

(b) Training Techniques.

(6 marks)

15. Explain :

(a) Safety Inspection.

(4 marks)

(b) Safety Audit.

(4 marks)

(c) Job Safety Analysis.

(4 marks)

Or

16. Explain :

(a) Role of Management, Supervisors, Workmen and Union in an Industry.

17. Explain types of Industrial Hazards .

Or

18. Explain the various factors impeding Safety.

19. Explain :

(a) Chemistry of Fire.

(6 marks)

(b) Classification of Fire and its Prevention.

(6 marks)

Or

20. Explain various Industrial Fire protection systems.

[5 × 12 = 60 marks]