

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015****Eighth Semester**

Branch—Aeronautical Engineering/Mechanical Engineering

AN 010 805 G03/ME 010 805 L03—CRYOGENICS (Elective III) (ME), (Elective IV) (AN)  
(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.  
Each question carries 3 marks.*

1. Give a brief note on the historical development of cryogenics.
2. Differentiate liquefaction and refrigeration processes.
3. List the features of gas liquefaction systems.
4. Which are the gases and liquids used as refrigerants ?
5. What is the significance of cryopumping ?

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.  
Each question carries 5 marks.*

6. Differentiate super fluidity and super conductivity.
7. Write a short note on thermal properties of materials.
8. How is low temperature produced ? Why ?
9. Explain the properties of refrigerants.
10. Write short note on adiabatic demagnetization.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.  
Each question carries 12 marks.*

11. Explain the applications of cryogenics in biology and medicine.

Or

12. Explain the superconductivity applications.

Turn over

13. Explain the isothermal, adiabatic and Joule Thomson expansion process.

*Or*

14. Explain the materials of constructions for cryogenic applications. What are the required properties ?

15. Explain the architecture of general liquefaction systems.

*Or*

16. Explain the architecture and operation of liquefaction system for hydrogen with suitable diagram.

17. Explain the architecture and operation of general refrigeration systems.

*Or*

18. Explain the characteristics of ideal refrigeration system.

19. Briefly explain about the basic design parameters of cryogenic fluid storage vessels.

*Or*

20. Briefly explain with T-S diagram any commercially available refrigerator.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015****Eighth Semester**

Branch : Mechanical Engineering

AUTOMOBILE ENGINEERING (M)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

**Part A***Answer all questions.**Each question carries 4 marks.*

1. Briefly discuss the working of diesel fuel pump.
2. What is the significance of "radiant resistance" ?
3. Explain the principle of manual gear box.
4. Discuss the principle of torque converter.
5. What is a "torsion bar" ?
6. Write the importance of suspension system.
7. Write a note on impact beams.
8. What is the principle of "hybrid vehicle" ?
9. List the limitations of electronic ignition.
10. Explain the principle of bandix drive.

(10 × 4 = 40 marks)

**Part B***Answer all questions.**Each question carries 12 marks.*

11. Explain the working of various engine components. Discuss the methods for troubleshooting.
- Or*
12. How will you determine the acceleration and power requirement for an application ? Explain the procedure for selection of gear ratios.

**Turn over**

13. With neat sketches, explain the following :—

- (i) Centrifugal clutch.
- (ii) Conical spring clutch.

(6 marks)

(6 marks)

*Or*

14. What is a universal joint? Explain its principle. Discuss the principles of “constant velocity universal joint”.

15. Discuss all the constructional features of automobile suspension systems.

*Or*

16. Discuss the geometry and specific features of a typical automobile front wheel.

17. Write notes on :

- (i) Ply ratings.
- (ii) Vintage car.
- (iii) Motor Vehicle Act.

(4 marks)

(4 marks)

(4 marks)

*Or*

18. Discuss all types of braking mechanisms. Discuss different components.

19. Discuss all the battery charging and ignition systems, of an automotive system.

*Or*

20. Discuss the parts of voltage regulators and horn relays. Explain in detail.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015****Eighth Semester**

Branch—Automobile Engineering/Mechanical Engineering

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

(New Scheme—2010 Admissions)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

*Answer one full question from each module.**Use of design data book is permitted.**Missing data may be assumed.***Module I**

1. A motor shaft rotating at 1500 r.p.m has to transmit 15 kW to a low speed shaft with a speed reduction of 3 : 1. Assume starting torque to be 25% higher than the running torque. The teeth are 20° involutes with 25 teeth on the pinion. Both the pinion and gear are made of C45 steel. Design a spur gear drive to suit the above conditions and check for compressive and bending stresses and plastic deformations. Also sketch the spur gear drive.

*Or*

2. A pair of helical gears subjected to moderate shock loading is to transmit 37.5 kW at 1750 r.p.m. of the pinion. The speed reduction ratio is 4.25 and the helix angle is 15°. The service is continuous and the teeth are 20° FD in the normal plane. Design the gears, assuming a life of 10,000 hours.

**Module II**

3. A multi-disk clutch consists of five steel plates and four bronze plates. The inner and outer diameters of friction disks are 75 mm and 150 mm respectively. The coefficient of friction is 0.1 and the intensity of pressure is limited to 0.3 N/mm<sup>2</sup>. Assuming the uniform wear theory, calculate :

- (i) the required operating force, and ;
- (ii) power transmitting capacity at 750 r.p.m.

*Or*

4. A leather faced conical clutch has cone angle of 30°. The pressure between the contact surfaces is limited to 35 N/mm<sup>2</sup> and the breadth of the conical surface is not to exceed 1/3 of the mean radius. Find the dimensions of the contact surface to transmit 22 kw at 2000 r.p.m.. Also calculate the force required to engage the clutch. Take  $\mu = 0.1$ .

**Turn over**

**Module III**

5. A 2 kW power is applied to a worm shaft at 720 r.p.m. The worm is of quadruple start with 50 mm as pitch circle diameter. The worm is of quadruple start type with 50 mm as pitch circle diameter. The worm gear has 40 teeth with 5 mm module. The pressure angle in the diametral plane is  $20^\circ$ . Determine :
- (i) the lead angle of the worm ;
  - (ii) velocity ratio, and
  - (iii) centre distance.

Also, calculate efficiency of the worm gear drive, and power lost in friction.

*Or*

6. A machine tool gear box is to have 9 speeds. The gear box is driven by an electric motor whose shaft rotational speed is 1400 r.p.m. The gear box is connected to the motor by a belt drive. The maximum and minimum speeds required at the gear box output are 1000 r.p.m. and 200 r.p.m. respectively. Suitable speed reduction can also be provided in the belt drive. What is the step ratio and what are the values of 9 speeds ? Sketch the arrangement. Obtain the number of teeth on each gear and also the actual output speeds.

**Module IV**

7. A journal bearing 160 mm long and 45 mm dia. supports a radial load of 8,000 N. The shaft speed is 160 r.p.m.; oil used is SAE 60 at  $25^\circ\text{C}$  inlet temperature. Using clearance ratio 600, find the rise in temperature, maximum films pressure and minimum film thickness.

*Or*

8. A heated roll is used to evaporate water from pulp in the production of paper. This roll is mounted onto a two inch diameter shaft for which a journal bearing needs to be designed. The roller sees a total load of 1500 pounds, which is distributed evenly between two identical bearings. The roll speed is 2000 rev/min and SAE 10 oil is readily available (it is used throughout the paper mill and is in abundant supply). The oil inlet temperature is thought to be around  $110^\circ\text{F}$ . Because of clearance issues, the bearing width must be one inch or less. Find :

- 1 The radial clearance of the bearing for optimum load carrying capacity.
- 2 The surface finish required on the bearing.
- 3 The temperature rise, friction coefficient, flow rate and side flow rate of oil through the bearing. (These are needed to prescribe heat exchangers for the oil reservoir).
- 4 Comment on the importance of the inlet temperature, that is, what effect on the bearing performance would occur if the inlet temperature were  $130^\circ\text{F}$  ?

(5 × 12 = 60 marks)

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Reg. No.....

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**B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**

**Eighth Semester**

Branch : Mechanical Engineering/Automobile Engineering

AU 010 802/ME 010 802—OPERATIONS MANAGEMENT (AU, ME)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.*

*Each question carries 3 marks.*

1. What are the main functions of operation management ?
2. Define aggregate planning.
3. Differentiate flow shop and job shop scheduling.
4. What are the types of maintenance ?
5. Define Push Pull Production.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Explain tactical and operational decisions with example.
7. Explain the enhanced features in MRP II over MRP.
8. Explain single machine scheduling.
9. Explain bath tub curve.
10. Write a note on drivers of supply chain.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain the importance of forecasting in decision making. Explain any *one* method of forecasting with example.

Or

Turn over

12. A private firm has the following sales pattern during 2008 to 2014. Compute the sales forecast for the year 2015.

Year	...	2008	2009	2010	2011	2012	2013	2014
Demand	...	1200	1450	1200	1350	1150	1200	1250

13. Explain the transportation model for aggregate planning.

Or

14. Explain CRP and DRP process.

15. Find the sequence that minimizes the total elapsed time (in hours) required to complete the following jobs on five machines in the order M1 to M5. Find the optimal sequence, minimal total elapsed time and idle times associated with each machines.

Machine	Jobs			
	A	B	C	D
M1	15	12	5	8
M2	10	8	8	7
M3	8	10	7	6
M4	3	8	7	6
M5	12	10	9	7

Or

16. Find out the optimum sequence for the jobs.

Machine	Jobs						
	A	B	C	D	E	F	G
M1	7	11	9	9	10	12	10
M2	10	10	7	16	6	10	15

17. Explain :

- (i) Replacement problem ;
- (ii) Reliability improvement.

Or

18. Explain the structure and modules of information system used for maintenance management.

19. Write short notes on :

- (i) Kanban systems.
- (ii) Flexible manufacturing systems.

Or

20. Explain supply chain micro process.

(5 × 12 = 60 marks)