

G 801

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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. What are CNG engines ? Discuss.
2. Briefly discuss the principle of MPFI system.
3. Discuss the concept of "semi-automatic transmission".
4. Write a note on torque tube drive.
5. Explain the principle of power steering.
6. Draw a neat sketch of gas charged shock absorber.
7. Discuss the principle of braking mechanism.
8. Write a note on "tube-less tyres".
9. Explain the techniques for engine tuning.
10. Discuss the importance of preventive maintenance.

(10 × 4 = 40 marks)

Part B

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

11. Explain the classification of engines in automobiles. Discuss the frame, body and engine construction of different automobiles.

Or

12. Discuss all the lubricating systems and cooling systems in engines.

(12 marks)

Turn over

13. Discuss the construction and working of constant mesh and sliding mesh gear boxes.

Or

14. Discuss the principle and working of front wheel, rear wheel and four wheel drives.

(12 marks)

15. Explain the construction and working of different gear boxes.

(12 marks)

Or

16. Explain, with details :—

(a) Macpherson strut.

(4 marks)

(b) Sliding pillar.

(4 marks)

(c) King pin inclination.

(4 marks)

17. Discuss the different types of components and attachments of hydraulic brakes.

(12 marks)

Or

18. Explain all the aspects of automotive air conditioning.

(12 marks)

19. Discuss, with examples :

(a) Automotive lighting.

(4 marks)

(b) Dynamos and alternators.

(4 marks)

(c) Garage tools and equipments.

(4 marks)

Or

20. Discuss the different tests for engines for : (i) noise, (ii) vibration ; and (iii) performance. Explain the detailed procedures and significance of the tests.

(12 marks)

[5 × 12 = 60 marks]

G 823

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Mechanical Engineering

MACHINE DESIGN AND DRAWING-II (M)

(Old Scheme—Prior to 2010 Admissions)

Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Answer any two questions from Part A and Part B.

Design data book is permitted.

Missing data may be assumed.

Part A

1. (a) Explain the advantages and disadvantages of worm gear drive. (5 marks)
(b) Design a helical gear pair : Power transmitted = 30 kW, speed of pinion = 1500 r.p.m., pressure angle in diametral plane : 20° full depth involute, helix angle = 30° , velocity ratio = 4, Number of teeth on pinion = 24, static stress for cast steel = 50.71 N/mm^2 , BHN for gear material = 350. (20 marks)
2. (a) Derive the Lewis equation from fundamentals. (5 marks)
(b) A cast steel pinion rotating at 700 r.p.m. drives a bronze spur gear. The module is 6 mm. and speed ratio is 4 : 1. The pinion has 16 teeth of 20° full depth involute profile. The face width of both gears is 75 mm. Determine the power that can be transmitted. (20 marks)
3. (a) Discuss the force analysis of bevel gears. (5 marks)
(b) A hardened steel worm rotating at 1200 r.p.m. transmits power to a phosphor bronze gear ($\sigma_0 = 55 \text{ MN/m}^2$), transmission ratio is 15 : 1. The centre distance is 200 mm. Determine power input rating. (20 marks)
4. (a) Write notes on gear materials. (5 marks)
(b) A pair of CI spur gears with 20° full depth transmit 8 kW at 900 r.p.m. of the pinion. The transmission ratio required is 4 and pinion has 20 teeth. Design the gears. (20 marks)

[2 × 25 = 50 marks]

Turn over

Part B

5. (a) Discuss the classification of rolling contact bearings. (5 marks)
- (b) A bronze backed babbitt bearing and a hardened steel journal is used to support a load of 4.5 kN at 600 r.p.m. The lubricant used is ring oiled bearing oil and operating temperature is 80° C. The bearing is relieved for 20° from normal to load line. Determine :
- length of bearing.
 - diameter of journal.
 - heat generated by friction ; and
 - Sommerfield number.
- (20 marks)
6. (a) Explain all the aspects of design of a centrifugal pump. (5 marks)
- (b) Explain :
- Antifriction bearing.
 - Rating life.
 - Clearance ratio.
 - Sommerfield number.
- (4 × 5 = 20 marks)
7. (a) Explain the working of a cylindrical roller bearing. (5 marks)
- (b) A 5 MW steam turbine runs at 2,000 r.p.m. is mounted between two journal bearings. The distance between bearing centres is 1 m. A runner weighing 2 kN is mounted at the centre of the shaft. Design the bearing. (20 marks)
8. (a) Discuss, in detail the concept of oil seals. (5 marks)
- (b) A single-row deep groove ball bearing is to carry a radial load of 2.5 kN and a thrust of 1.5 kN. The service imposes light shock and bearing is to operate 40 hours per week for four years. The speed of the shaft is 900 r.p.m. Select a ball bearing for this application. (20 marks)
- [2 × 25 = 50 marks]

G 1006

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Mechanical Engineering

ME 010 803—PRODUCTION ENGINEERING (ME)

(New Scheme—2010 Admissions—Regular)

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Distinguish between orthogonal and oblique cutting.
2. Mention three important properties of tool materials.
3. Write short note on impact compacting.
4. Write the application of ceramic materials.
5. Write short note on LIGA process.

(5 × 3 = 15 marks)

Part B

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

6. Explain the various elements of single point cutting tool, with help of a neat sketch.
7. Define machinability. How can it be measured? Explain.
8. Explain the characteristics of metal powders in P/M.
9. What are fibre -reinforced materials ? List the advantages of composite materials.
10. Explain IBM.

(5 × 5 = 25 marks)

Part C

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

11. (a) Discuss mechanism of chip formation.
- (b) Name two system of tool designation.
- (c) Why a negative rake angle is normally employed for cutting hard and strong materials ?

(6 + 3 + 3 = 12 marks)

Or

Turn over

12. In an orthogonal cutting operation, the following data have been observed.

Uncut chip thickness (t) = 0.127mm

Width of cut (b) = 6.35 mm

Cutting speed (V) = 2m/s

Rake angle (α) = 10°

Cutting force (F_c) = 567N

Thrust force (F_t) = 227N

Chip Thickness (t_c) = 0.228mm

Determine : Shear angle, the friction angle, shear stress along the shear plane and the power for the cutting operation.

(4 × 3 = 12 marks)

13. Define Tool life. Explain in detail different factors influence the tool life. (4 + 8 = 12 marks)

Or

14. Explain the function of cutting fluid in machining. Describe the classification and application of cutting fluids. (4 + 8 = 12 marks)

15. Explain in detail production of metal powders in P/M. (12 marks)

Or

16. Explain the following power compaction process.

(a) HIP.

(b) CIP.

(6 + 6 = 12 marks)

17. Discuss various ceramic structures and its properties. (12 marks)

Or

18. Explain the different type of composite materials. Explain pultrusion process.

(8 + 4 = 12 marks)

19. With a neat sketch explain the working of EDM. Give the advantage, disadvantage and product application of EDM.

(6 + 2 + 2 + 2 = 12 marks)

Or

20. With a neat sketch explain the working of ECM. Give the advantage, disadvantage and product application of ECM.

(6 + 2 + 2 + 2 = 12 marks)

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, MAY 2014**Eighth Semester**

Branch : Mechanical Engineering

ME 010 804 L01 – AEROSPACE ENGINEERING (Elective III) [ME]

(New Scheme–2010 Admissions)

[Regular]

Time : Three Hours

Maximum : 100 Marks

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

1. Define Reynolds number.
2. Distinguish the terms Range and Endurance.
3. Define the following :
 - (a) Aerodynamic center.
 - (b) Center of pressure.
4. What is escape velocity?
5. Draw the pressure distribution over a symmetric aero foil at a small positive angle of attack.

(5 × 3 = 15 marks)

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

6. What are the merits of Turbo-fan engine over Turbo-jet engine?
7. Explain about the structure of atmosphere.
8. Explain about Service ceiling and Absolute ceiling.
9. How the airspeed is measured in Airplanes?
10. Explain the concept of horse shoe vortex with the help of neat diagram.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. (a) Derive the Hydrostatic equation of atmosphere.
(b) Simplify Navierstoke's equation for two dimensional steady, inviscid and incompressible flows.

Or

12. (a) Find density, pressure and temperature of air at 1000 m, 5000 m, 15000 m.
(b) Determine the mach number of a flying object with 1200 km/hr at these altitudes.
13. Explain in detail about Angle of attack *vs* Coefficient of lift and drag, angle of attack *vs* center of pressure of an aero foil with necessary diagrams.

Or

14. Explain the concept of boundary layer, predict velocity profile of a laminar and turbulent boundary layers over a plate.
15. Derive the blade element theory. State its assumptions.

Or

16. With neat sketch, explain Turbojet engines. Give advantages of turbojet over turbo fan engines.
17. Derive an expression for takeoff distance of an airplane.

Or

18. Draw and explain V-n diagram, also mark absolute and service ceiling on it, explain then briefly.
19. Explain a typical Liquid propellant rocket engine with neat diagram, list out their merits and demerits, write examples of four generally used liquid propellant combinations.

Or

20. Explain any *two* types of supersonic wind tunnels in detail, with sketches.

(5 × 12 = 60 marks)

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Mechanical Engineering /Aeronautical Engineering

ME 010 804 L03 / AN 010 805 G03 – CRYOGENICS (Elective III, IV) [ME, AN]

(New Scheme–2010 Admissions)

[Regular]

Time : Three Hours

Maximum : 100 Marks

Use of refrigeration charts and tables, heat and mass transfer data book and steam tables are permitted

Part A

Answer all questions.

Each question carries 3 marks.

1. Discuss the application of cryogenics in manufacturing process.
2. Explain Meissner effect.
3. What do you mean by Joule Thomson effect?
4. What are Dilution refrigerators?
5. Describe multilayer insulations.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Differentiate between Type I and Type II Super conductors.
7. Simple Linde-Hampson system is not preferred for hydrogen. Why?
8. Describe Ortho-Para Hydrogen conversion.
9. Discuss the role of Regenerator in cryogenic refrigeration systems.
10. What are piping arrangement in cryogenics storage vessels?

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** questions.

Each full question carries 12 marks.

11. (a) Briefly explain historical development of Cryogenic engineering since 1982.
(b) What are the present areas of Cryogenic engineering?
Or
12. (a) Write the application of cryogenics in biology and medicine.
(b) Discuss the application of cryogenics in space technology.
13. (a) Explain the properties of cryogenic fluids.
(b) Discuss mechanical properties of engineering materials at low temperature.
Or
14. (a) What are the methods of producing low temperatures?
(b) Discuss the properties of Helium at cryogenic range.
15. (a) Describe Simon helium-liquefaction system.
(b) Explain the liquefaction system for LNG.
Or
16. (a) What are the critical components of liquefaction systems?
(b) Determine the liquid yield, the total work per unit mass of gas compressed, and the work to liquefy a unit mass of gas for the Claude system using nitrogen as the working fluid. The system operates between 101.3 kPa (1 atm) and 300 K and 5.066 MPa. The expander flow rate ratio is 0.60 and expander work is utilized to aid in compression of gas. The condition of gas at the inlet of expander is 270 K and 5.066 MPa.
17. Explain the working of Magnetic refrigerators with neat sketch. Draw the TS diagram and list out its advantages.
Or
18. Describe Solvay refrigerator with neat sketches and explain the TS diagram.
19. Explain in detail about different types of insulations used in cryogenics equipments.
Or
20. Discuss Cryogenic fluid storage and transfer systems with neat sketches.

(5 × 12 = 60 marks)

G 1071

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Mechanical Engineering / Production Engineering

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

(New Scheme–2010 Admission onwards)

[Regular]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. Bring out the importance of safety organization.
2. Define Accident prevention. What are the accident prevention methods?
3. What is safety survey? Give its importance.
4. Define Industrial hygiene.
5. What is fire made of? Give the chemical composition of fire.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Write a note on safety policy. How are safety and productivity related?
7. Explain the economic importance of accidents.
8. What is the difference between safety inspection and safety audit?
9. Define occupational health. Explain its objectives.
10. What are the preventive measures of fire hazards?

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. Define Safety Committee. Also explain the advantages and types of safety committee.

Or

12. What is the importance of safety education and training? What are the various training methods?

13. "Preventable accidents, if not prevented due to our negligence, is nothing short of a murder". Explain the significance of Dr. S. Radhakrishnan's remarks. Explain briefly the safety philosophies.

Or

14. Explain the theories and principles of accident causes and cost of accidents.

15. Describe the role of management, supervisors, workmen, unions, and government in safety.

Or

16. Discuss the means and objectives of job safety analysis. Explain the process and procedure.

17. Discuss the various types of industrial hazards. How are check lists useful in identifying industrial hazards?

Or

18. What is occupational noise exposure? What monitoring is required? What is an employer required to do following an audiogram evaluation?

19. What are the general requirements for Fire Safety Planning? What are the ten step process for developing a Fire safety Plan?

Or

20. Discuss the safety precautions in assembly unit of automobile industry.

(5 × 12 = 60 marks)

G 978

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch: Automobile Engineering/Mechanical Engineering

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

(New Scheme—2010 Admissions)

[Regular]

Maximum : 100 Marks

Time : Three Hours

Answer all questions.

Each full question carries 25 marks.

Use of design data book is permitted.

Missing data may be assumed

1. A cone clutch is used to connect an electric motor running at 1440 r.p.m. with a machine that is stationary. The machine is equivalent to a rotor of mass 150 kg. and radius of gyration as 250 mm. The machine has to be brought to full speed of 1440 r.p.m. from a stationary condition in 40 seconds. The semi-cone angle is 12° . The mean radius of clutch is twice of the face width. The coefficient of friction is 0.2 and normal intensity of the pressure between contacting surface should not exceed 0.1 N/mm^2 . Assuming uniform wear criterion, calculate
- (a) The inner and outer diameters ;
 - (b) The face width of the friction lining ;
 - (c) The force required to engage the clutch ; and
 - (d) The amount of heat generated during each engagement of clutch.

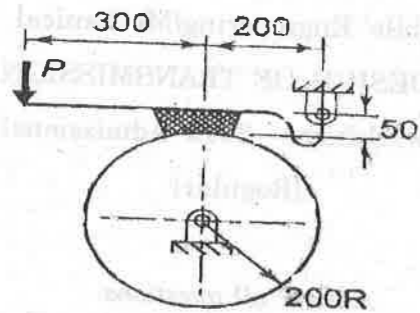
(25 marks)

Or

2. A single block brake with a torque capacity of 250 Nm. is shown in figure. The brake drum rotates at 100 r.p.m. and coefficient of friction is 0.35. calculate
- (a) The actuating force and hinge-pin reaction for clockwise rotation of drum.
 - (b) The actuating force and hinge-pin reaction for anti-clockwise rotation of drum.
 - (c) The rate heat generated during braking action.

Turn over

- (d) The dimensions of the block if the intensity of the pressure between the block and the brake drum is 1 N/mm^2 . The length of the block is twice its width. State whether the brake is self-locking.



All measurements are in mm.

- (25 marks)
3. Design a journal bearing for a centrifugal pump for the following data. Load on the journal 20000 N. Speed of the journal is 900 r.p.m. Type of the oil SAE 10, for which absolute viscosity at 55°C is 0.017 kg/msec . ambient temp at the oil is 15.5°C . The max bearing pressure for the pump is 1.5 N/mm^2 . Calculate the mass of the lubricating oil required for artificial cooling. If rise of temp of oil be limited to 10°C . Heat dissipation coefficient is $1232 \text{ W/m}^2/^\circ\text{C}$.

(25 marks)

Or

4. (a) Select a single row deep groove ball bearing for a radial load of 4000 N and axial load of 5000 N operating at a speed of 1600 r.p.m. for an average life of 5 years at 10 hr./day. Assume uniform and steady load.

(20 marks)

- (b) Explain hydro dynamic lubrication with neat sketch.

(5 marks)

5. (a) Explain formative or equivalent number of teeth for helical gear.

(5 marks)

- (b) A pair of helical gear are to transmit 15 kW. The teeth are 20° stubs in diametrical plane and have a helix angle 45° . The pinion runs at 1000 r.p.m. and has 80 mm. pitch diameter. The gear has 320 mm. pitch diameter. If the gear are made of cast steel having allowable static strength of 100 MPa, determine a suitable module and face width from static strength consideration and set the gear for wear. Given $\sigma_{es} = 618 \text{ MPa}$.

(20 marks)

Or

6. (a) List any *three* advantages and disadvantages of worm gear drive. (5 marks)
- (b) A hardened steel worm rotating at 12000 r.p.m. transmit power to phosphor bronzes gear. ($\sigma_d = 55 \text{ MN/m}^2$) with transitions ratio of 15 to 1. The center distance is 200 mm. Determine the power input rating from stand point of strength.

(20 marks)

7. Design a cast-iron cylinder for a four-stroke water cooled diesel engine developing 5 kW at 1500 r.p.m. Assume the indicated mean effective pressure at the full load condition is 750 kN/m^2 . Also find out other dimensions such as

- (a) Thickness of cylinder block wall ;
 (b) The thickness of cylinder flange ; and
 (c) Diameter of stud.

Allowable strength for cast iron material ($\sigma = 60 \text{ N/mm}^2$). Poisson ratio $\mu = 0.21$, number of stud = 10, allowable strength for stud = 80 N/mm^2 .

(25 marks)

Or

8. Explain the general design recommendation of welded parts and castings. (25 marks)

[4 × 25 = 100 marks]

G 988

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Eighth Semester

Branch : Mechanical Engineering/Automobile Engineering

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

(New Scheme—Regular—2010 Admissions)

Maximum : 100 Marks

Time : Three Hours

Part A

Answer all questions.

Each question carries 3 marks.

1. What are the factors affecting forecast ?
2. What are the basic inputs of MRP ?
3. Distinguish between Flow shop scheduling and Job shop scheduling.
4. What are the basic reasons for replacement ?
5. Write a note on Kanban system.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Give a brief description of classification of decisions.
7. Differentiate between MRP I and MRP II.
8. Briefly discuss the measures of performances in single machine scheduling problem.
9. What is reliability? What are the ways of improving reliability of a system ?
10. What are the objectives of supply chain management ?

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each question carries 12 marks.

11. The following data gives the sales of the company for various years. Fit the straight line. Forecast the sales for the year 1998 and 1999.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997
Sales	13,000	20,000	20,000	28,000	30,000	32,000	33,000	38,000	43,000

Or

Turn over

12. Estimate the sales forecast for the year 2000, using exponential smoothing forecaster. Take $\alpha = 0.5$ and the forecast for the year 1995 as 160×10^5 units :

Year	1995	1996	1997	1998	1999
Sales (Rs.)	180×10^5	168×10^5	159×10^5	170×10^5	188×10^5

13. What do you mean by aggregate planning ? List and explain various pure strategies and mixed strategies.

Or

14. What is MPS ? Explain it with an example.

15. The Processing time (t_j) in hours for the five jobs of single machine scheduling is given

Job (j)	1	2	3	4	5
Processing Time (t_j) hrs	30	8	10	28	16
Weight (W_j)	1	2	1	2	3

- (a) Find the optimal sequence which will minimise the mean flow time and find the mean flow time.

- (b) Determine the sequence which will minimise the weighted mean flow time and also find the weighted mean flow time.

Or

16. Consider the following 3 machine five jobs flow shop table.

Job	Processing Time		
	Machine 1	Machine 2	Machine 3
1	8	5	4
2	10	6	9
3	6	2	8
4	7	3	6
5	11	4	5

- (a) Check whether Johnson's algorithm can be extended to this problem.

- (b) If yes find the optimal sequence and corresponding makespan.

17. What is TPM ? Also, list its objectives and benefits.

Or

18. What is FMECA ? Explain the different performance measures of maintenance system.

19. What is FMS ? Explain in detail about equipments used in FMS. Discuss the aims of FMS.

Or

20. Explain in detail about the drivers of supply chain.

(5 × 12 = 60 marks)