B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering/Automobile Engineering

PRODUCTION ENGINEERING (M U)

(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. Write a note on deformation of metals.

2. Explain effect of rake angle.

3. Define machinability index.

4. Define compressibility.

5. What are the characteristics of machine powder ?

6. What is compaction ?

7. Explain the applications of smart materials.

8. List physical properties of ceramics.

9. Explain the types of LIGA.

10. Write a note on USM.

(10 × 4 = 40 marks)

Part B

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

11. With a neat sketch explain the mechanism of orthogonal cutting.

Or

12. What are effect of cutting angle, nose radius on cutting force and surface finish ? Derive the relationships.

13. Deduce Taylor's equation.

Or

14. Explain types, properties of tool materials.

Turn over

15. Explain the properties of fine powder.

Or

16. Explain different compaction techniques.

17. Explain common types of ceramics. List out its applications.

Or

18. Explain properties and applications of nickel based alloys.

19. Explain EBM with the process and advantages.

Or

20. Explain abrasive water jet machining.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering

PRODUCTION PLANNING AND CONTROL (M)

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. What are the advantages of production planning and control ?

2. Write a note on correlation analysis.

3. Explain characteristics of production planning.

4. Explain capacity planning.

5. What are the assumptions made in sequencing ?

6. Explain sequencing n jobs through m machines.

7. What is ERP ?

8. Explain supply chain management.

9. What are the reasons for scheduling ?

10. Explain procedure of dispatching.

(10 × 4 = 40 marks)

Part B

Answer all questions.
Each question carries 12 marks.

11. (a) Explain the methods of sales forecasting.

Or

(b) Compute a linear trend line for the following data and check if it is more accurate than exponential soothing and adjusted exponential smoothing forecasts. Take α = 0.25 and β = 0.45.

Period	1	2	3	4	5	6	7	8	9	10	11	12
Demand	700	760	820	680	880	1020	860	880	1000	1160	1040	1020

Turn over

12. (a) Explain objectives and characteristics of production planning.

Or

(b) Explain bill of materials and product structure.

13. (a) Find the optimal sequence and the corresponding make scan for the following 2 machine and 6 job problem.

Job	Machine 1	Machine 2
1	15	20
2	14	16
3	18	8
4	8	12
5	25	14
6	10	12

Or

(b) Explain the solution to sequencing n jobs through m machines.

14. (a) Explain components of integrated material management.

Or

(b) Explain the components of stores management and purchase management.

15. (a) Explain scheduling using PERT.

Or

(b) Use CPM to the following sequence of activities. Draw the network diagram and find shortest time needed to complete the work.

Activity	Duration	Predecessors
A	8	–
B	12	A
C	7	A
D	12	B
E	11	C
F	8	D, E
G	9	E
H	4	F, G
I	6	H
J	5	A
K	3	I, J
L	8	K

(5 × 12 = 60 marks)

G 1438

Reg. No..

Name..

B.TECH. DEGREE EXAMINATION, MAY 2015

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 **two** *questions each from PART* A *and PART* B
Design data book is permitted. Missing data may be appropriately assumed.

Part A

1. (a) What is Lewis form factor ? Explain the relation between Lewis form factor and number of teeth in a gear.

(6 marks)

(b) A pair of spur gear 30° full depth involutes teeth is to be designed RPM of input shaft is 1100 and it receives 10 kW power. The speed of gear shaft is reduced to 300 r.p.m. Pinion and shalt are made of steel with σ_{gp} = 750 MPa, Service factor is 1.5 and factor of safety is 2.

(19 marks)

2. (a) Compare the performance of helical and spur gears.

(5 marks)

(b) A pair of helical gears with speed ratio 2.5 is to be designed. Following data is given: Speed of pinion = 525 r.p.m., Power to be transmitted = 8 kW. Gear surfaces are heat treated to 400 B HN. Service factor = 1.5. Factor of safety = 2. σ_{yp} of material = 650 MPa. Design the drive.

(20 marks)

3. (a) Explain the advantages of bewel gear.

(5 marks)

(b) A pair of bevel gear with Zp = 30, Zg = 60 has module of 6 mm and face width of 50 mm. Ultimate strength of gear material is 500 MPa. Determine beam strength of gear. Suggest suitable hardness of gears.

(20 marks)

4. (a) What is the significance of heat dissipation ?

(5 marks)

Turn over

(b) A worm and worm wheel set is designated by 2/54/10/8. The effective surface area of gear housing is 1.8 m³ and heat transfer coefficient is 16 W/m² °c. If the ambient temperature is 25° C. Work shaft runs at 1000 r.p.m. Power transmitted through worm is 4 *k*W then what the rise in temperature of lubricating oil is.

(20 marks)

(2 × 25 = 50 marks)

Part B

5. (a) Differentiate thick film and thin film lubrication.

    (b) Explain the design of ball bearing with radial load 3kN, axial thrust 1.5 *k*N, rotation speed 5500 rpm, diameter of the spindle is 30 mm. Expected to work for 50 hours/week in a year.

6. A single row deep groove ball bearing has a dynamic load capacity of 13,600 N and operates at the following cycle :

    (a) Radial load 5,000 N at 600 r.p.m. for 25% of time.

    (b) Radial load of 7,500 N at 700 r.p.m. for 25% of time.

    (c) Radial load of 6,000 N at 720 r.p.m. for 50% of time.

    Calculate the life of the bearing.

7. A ball bearing carries a radial load of 4 *k*N and is to be designed for 6,000 hours of operation at 1500 r.p.m. with a reliability of 95%. Select the bearing.

8. Select a suitable impeller for a centrifugal pump with following specifications :

    Discharge: 1250 1pm

    Speed: 2500 rpm

    Suction lift : 7.5 m of water

    Deliver head : 35 m of water

(2 × 25 = 50 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering

AEROSPACE ENGINEERING (Elective II) (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. Explain the characteristics of troposphere.

2. Distinguish compressible and non-compressible flows.

3. Write a note on aerodynamic center.

4. Write short note on aerofoil.

5. Define propeller coefficients.

6. Distinguish bypass and after burners.

7. Explain take-off and landing performance.

8. Define stalling speed.

9. What is the application of altimeters ?

10. Distinguish liquid and solid propellants.

(10 × 4 = 40 marks)

Part B

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

11. (a) Explain different levels of atmosphere and their characteristics.

Or

(b) Explain the pressure, density and temperature variations in international standard atmosphere.

12. (a) Derive the expressions for 2D viscous flow over bodies.

Or

(b) Determine the Mach number of an aircraft flying at 860 km./hr. at the altitude of 3000, 6000, and 12000 meters. Make the comparative analysis.

Turn over

13. (a) Describe the turbojet engine with neat diagram. Explain its advantages and disadvantages.

Or

(b) Find out the thrust produced by the propeller ; slip stream velocity, ideal efficiency of the propeller given following details. The aircraft is flying at an altitude of 7500 meters, weighing 12000 kg, at a speed of 150 m/s with a propeller of 4.5 m. Lift/drag ratio is 5.

14. (a) Explain the different measurements for takeoff and landing performance.

Or

(b) Write short note on (i) Performance curves ; (ii) Circling flight ; and (iii) Minimum power conditions.

15. (a) Explain how pressure and velocity are measured using wind tunnels.

Or

(b) Explain the calculation earth orbiting and escape velocities. Explain the importance of these measurements in rocket propulsion.

(5 × 12 = 60 marks)

G 1489

Reg. No.....................................

Name.....................................

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering

TOTAL QUALITY MANAGEMENT (Elective III) (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. Define customer satisfaction ?

2. How employees are involved in TQM ?

3. What is reengineering ? —

4. What are the quality criteria for supplier selection ?

5. Explain how sample size is determined.

6. Explain about Pareto diagram.

7. What are the features of total quality control ?

8. Write a note on Poka-Yoka.

9. Explain the problems of TQM.

10. List the steps involved in TQM implementation.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 marks.

11. Explain the methods of exployee motivation and their limitations.

Or

12. Describe the role of leadership in TQM.

13. What is continuous process improvement ? How it is essential for TQM.

Or

Turn over

14. Explain Juran trilogy and its application.

15. Explain the features of statistical process control.

Or

16. Explain Failure mode and effect analysis.

17. Explain Just In Time concept and how it is used for total quality control.

Or

18. Explain the types of quality circles.

19. Explain TQM with reference to manufacturing industry.

Or

20. Explain how the quality factor impacts the sale of a product with a example.

(5 × 12 = 60 marks)

G 1626

(Pages : 2)

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Automobile Engineering/Mechanical Engineering

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

(Common to AU 010 801 and ME 010 801)

[New Scheme—2011 Admissions/Regular]

Time : Three Hours   Maximum : 100 Marks

*Answer any **two** questions from Part A and Part B.*
Each question carries 25 marks.
Assume missing data suitably.
Machine design data book as per syllabus is permitted.

Part A

Module 1 and 2.

1. An automotive single-plate clutch consists of two pairs of contacting surfaces. The outer diameter of the friction disc is 270 mm. The co-efficient of friction is 0.3 and the maximum intensity of pressure is 0.3 MPa. The clutch is transmitting a torque of 531 N-m, (assuming uniform wear, calculate (i) the inner diameter of the friction disc ; and (ii) spring force required to keep the clutch engaged.

2. A simple band brake of drum diameter 650 mm has a band passing over it with an angle of contact of 225°. While one end of the band is connected to the fulcrum, the other end is connected to the brake lever at a distance of 410 mm from the fulcrum. The brake lever is 1100 mm long. The brake is to absorb a power of 15 kW at 720 r.p.m. Design the brake lever of rectangular cross-section assuming the depth to be twice the width.

3. Determine the dimension of the bearing and journal to support a load of 6 kW at 750 r.p.m. using hardened steel journal and bronze backed basic bearing. An abundance of oil provided which has a specific gravity of 0.95 at 15.5°C and viscosity of 9.5 centi stokes at 82°C, that may be taken to the limiting temperature of oil. Assume a clearance of 0.001 mm per mm of diameter is allowed.

4. Derive Petroff's equation for the coefficient of friction in a lightly loaded bearing.

Turn over

Part B

Module 3 and 4.

5. In a spur gear, a 11 kW motor running at 1450 r.p.m. drives a shaft through a pair of spur gears with a velocity ratio of 4.5 : 1. Forged steel SAE 1045 pinion and CI gear are specified. Design the gear and check for dynamic and heat load considerations.

6. Derive an expression for beam strength of a spur gear tooth (Lewis equation) using standard notations. State the assumptions under which this equation is valid.

7. Find the diameter of a steel connecting rod for an engine in which the maximum load on the piston is 700 kN. Crank of the engine is 0.6 m radius, connecting rod length 3 m, factor of safety is 8.

8. A single cylinder double acting steam engine delivers 187.5 kW at 100 rev/min. The maximum fluctuation of energy/revolution is 15 per cent. The speed variation is limited to 1 percent either way from the mean. The mean diameter of the rim is 2.4 m. Design a cast iron flywheel for the engine.

(4 × 25 = 100 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering/Automobile Engineering

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

(New scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. What are the objectives of operation management ?

2. What is product structure ?

3. Differentiate scheduling and sequencing.

4. Explain the need for replacement.

5. Define supply chain.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain different types of decisions with example.

7. Write a note on DRP.

8. Explain Johnson's algorithm.

9: Distinguish individual and group replacement policies.

10. Write a note on ERP.

(5 × 5 = 25 marks)

Part C

Answer all question.
Each question carries 12 marks.

11. Compute the adjusted exponential forecast for the first week of March for a firm with the following

Turn over

data. Assume the forecast for first week of January as 600 and corresponding initial trend as zero. Let α=0.1 and β = 0.2.

Weeks	1	2	3	4	5	6	7	8
Demand	600	550	500	600	575	625	650	675

Or

12. A private firm has the following sales pattern during 2005 to 2012. Compute the sales forecast for the year 2013 :

Year	2005	2006	2007	2008	2009	2010	2011	2012
Demand	100	125	120	115	105	130	105	120

13. What is Aggregate planning ? Explain the methods and strategies.

Or

14. Explain MRP process.

15. Find the sequence that minimizes the total elapsed time (in hours) required to complete the following jobs on six machines in the order M1 to M6. Find the optimal sequence, minimal total elapsed time and idle times associated with each machines :

Machine	Jobs			
	A	B	C	D
M1	18	17	11	20
M2	8	6	5	4
M3	7	9	8	3
M4	2	6	5	4
M5	10	8	7	8
M6	25	19	15	12

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. What is TPM ? Explain its objectives and benefits.

Or

18. Explain different measures of maintenance performance.

19. Write short notes on (i) Just in time manufacturing (ii) Lean manufacturing.

Or

20. Explain objectives, process and drivers of supply chain management.

(5 × 12 = 60 marks)

G 1655

Reg. No...............................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering

ME 010 803—PRODUCTION ENGINEERING (ME)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Explain the effects of friction in machining process.

2. What is machinability ?

3. What are the needs of powder metallurgy ?

4. Write a note on composites.

5. Write a note on EDM.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Differentiate oblique and orthogonal cutting.

7. Explain the structure and composition of HSS.

8. Explain the micromachining process.

9. Explain phase diagram of Al_2O_3.

10. Write a note on LIGA process.

(5 × 5 = 25 marks,

Part C

Answer all questions.
Each question carries 12 marks.

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

   Uncut chip thickness = 0.127 mm.
   Width of cut = 6.35 mm.

Turn ove

Cutting speed = 2 m/s.

Rake angle = 10°.

Cutting force = 567 N.

Thrust force = 227 N.

Chip thickness = 0.228 mm.

Determine : Shear angle, the friction angle, shear stress along the shear plane and the power for the cutting operation. Also for the chip velocity and shear stain rate.

Or

12. Determine force component empirically.

13. Explain the structure and properties cemented carbides.

Or

14. The following equation for tool life is given for a turning operation :

$$VT^{0.13} f^{0.77} d^{0.37} = C.$$

A 60 minute tool life was obtained while cutting at V = 30 m/min., f = 0.3 mm/rev. and d = 2.5 mm.

Determine the change in tool life if the cutting speed, feed and depth of cut are increased by 20 % individually and also taken together.

15. Explain the characteristics of powder.

Or

16. Explain magneto rheological nano finishing process.

17. Explain structure and properties of ceramics.

Or

18. Explain the influence of fibre length, orientation and concentration.

19. Explain LBM, EBM and UBM with comparisons.

Or

20. Explain the phases involved in material addition process.

(5 × 12 = 60 marks)

G 1686

Reg. No....................................

Name.................................

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Mechanical Engineering

ME 010 804 L01 – AEROSPACE ENGINEERING (ELECTIVE III) |ME|

(New Scheme – 2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 marks.

1. Explain the characteristics of stratosphere.

2. What is the significance of Reynolds number?

3. What are propeller charts?

4. Explain Gliding.

5. Write short note on rocket motors.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 marks.

6. Explain supersonic flow phenomena.

7. Explain characteristics of aerofoil.

8. Enlist and discuss the performance of different aircraft engines.

9. Explain the service and absolute ceilings.

10. Explain the use of wind tunnels.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Derive the expressions for static, dynamic and stagnation pressures.

Or

12. Explain the pressure, temperature and density variations .in international standard atmosphere.

13. Explain 2D viscous flow of bodies applying dimensional analysis.

Or

14. Derive the expressions for pressure distribution in atmosphere.

15. Explain momentum and blade element theories of aerospace engineering.

Or

16. Explain the structure and operation of bypass and after burners.

17. Derive the expressions for length of runway required.

Or

18. Explain (i) Circling and banked flight ; and (ii) Take-off and landing performance.

19. Explain the principles of wind tunnel testing. What are the applications of wind tunnels ?

Or

20. Explain the architecture of solid and liquid propellant rockets.

(5 × 12 = 60 marks)

G 1688

Reg. No............................

Name............................

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Aeronautical Engineering / Mechanical Engineering

AN 010 805 G03/ ME 010 804 L03—CRYOGENICS (Elective III) (ME) (Elective IV) (AN)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Define Cryogenic Engineering.

2. What is Adiabatic Process ?

3. What is the function of gas liquefaction systems ?

4. Define Cryogenic refrigeration systems.

5. Describe about the cryogenic storage.

(5 × 3 = 15 marks)

Part B

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

6. List the application of Cryogenics.

7. Describe the Joule Thomson expansion process.

8. Draw the function of hydrogen liquefaction system.

9. Explain ideal refrigeration systems.

10. Explain in detail about Cryogenic fluid transfer systems.

(5 × 5 = 25 marks)

Part C

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

11. Sketch the cryogenics in space technology with suitable diagram.

Or

12. Describe about the superconductivity applications.

Turn over

13. Discuss in detail about the properties of Cryogenics fluids.

Or

14. With the help of neat diagram, explain the super fluidity.

15. Write in detail about production of low temperatures.

Or

16. Explain the liquefaction systems for neon.

17. Mention the demagnetization method with suitable diagram.

Or

18. Show the refrigerators using liquids with neat block diagram.

19. Briefly describe cryo pumping.

Or

20. Explain about cryogenic fluid transfer system.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

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/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. How is safety impact productivity in an industry ?

2. What is accident proneness ?

3. Write a note on safety survey.

4. Explain environmental hazards.

5. What are the causes of fire in industry ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. What are the roles and responsibilities of safety professional ?

7. Explain the safety motivation.

8. Explain risk management.

9. Explain the functional units of occupational health and hygiene.

10. Explain fire risks.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. Explain the safety planning procedure in an industry.

Or

12. Explain (i) safety policy ; (ii) safety organizations.

13. Explain the nature and causes of accidents. Brief about accident costs.

Or

14. Describe various equipments used for personal safety.

15. Explain safety sampling techniques.

Or

16. Involvement of every individual in industry is the need of safety. Justify.

17. Explain (i) hearing conservation program ; (ii) electrical and biological hazards.

Or

18. Explain physical, mechanical, social and chemical types of hazards.

19. Explain classification and detection of fires in industry.

Or

20. (i) Explain the contributing factors to industrial fires ; (ii) Write a note on fire load.

(5 × 12 = 60 marks)

B.TECH DEGREE EXAMINATION, MAY 2015

Eight 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. Enlist types of engines in automobiles.

2. Explain the process of fuel injection.

3. Explain the different types of clutches.

4. What is the use of axels ?

5. Write a note on steering mechanism.

6. Write a short note on air suspension.

7. Differentiate hydraulic and pneumatic brakes.

8. Explain the characteristics of tubeless tyres.

9. Write short note on electronic ignition.

10. What is the importance of wheel balancing ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 marks.

11. Explain the structure and mechanism of body and engine construction.

Or

12. Describe different types of resistance to the motion of the vehicle ? How they are taken care during vehicle construction.

13. Explain the principle and necessity of manual gear box.

Or

14. Explain the working of : (i) universal joints ; (ii) centrifugal clutches.

Turn over

15. Explain the different types of steering mechanisms.

Or

16. Explain rigid axel and independent suspension systems.

17. Explain the types of body and chassis constructions.

Or

18. Briefly explain the braking mechanism and different types of brakes.

19. Describe with the help of a circuit diagram, light and horn relays.

Or

20. Explain the equipments required for noise, vibration and performance tests.

(5 × 12 = 60 marks)