B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Eighth Semester

Branch : Mechanical Engineering/Production Engineering

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. How safety is relates with productivity ?

2. How motivation and communication increases safety in an industry ?

3. Write notes on safety audit.

4. Discuss on house keeping.

5. Classify the fire.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Explain safety planning and formulation of safety policy.

7. Discuss the training methods for safety and accident prevention in an industry.

8. Write notes on Risk Management.

9. How you can classify the industrial hazards ?

10. Explain about Fire Triangle.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Explain the following :

    (a) Role of safety professional.

    (b) Safety committee its need types and functions.

    (c) Safety organizations.

    Or

12. Explain the role of safety in an industry.

13. Write notes on :

    (a) Domino theory.

    (b) Safety training methods.

    (c) Accident prevention methods.

    Or

14. Explain how safety education and training helps in prevention of accidents and the use of PPE's.

15. Explain safety inspection and sampling techniques used for safety inspection.

    Or

16. Explain the role of industry management, supervisors, workmen and government on safety management.

17. Explain the term occupational health.

    Or

18. Explain the industrial hazards like :

    (a) Chemical.   (b) Electrical.

    (c) Physical.   (d) Environmental.

    (4 × 3 = 12 marks)

19. Explain the causes of fire in an industry and the prevention activities.

    Or

20. Explain industrial fire protection systems.

    [5 × 12 = 60 marks]

G 1140

(Pages : 2)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

METROLOGY AND INSTRUMENTATION (MU)

(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 the needs for measurement ?

2. Write notes on drunken error.

3. What are the steps to be followed while manufacturing of slip gauges ?

4. How angular measurement differs from linear measurement ?

5. What are the factors affecting surface roughness ?

6. Define RMS average.

7. What are the advantages of using laser beam in interferrometry ?

8. What is meant by best wire size in screw thread measurement ?

9. Define sensitivity.

10. What is the need for measuring the torque? Name the instruments that are used for the measurement of torque.

(10 × 4 = 40 marks)

Part B

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

11. Explain the various methods of measurement.

Or

12. With the help of neat sketch, explain the construction and working of a mechanical comparator.

13. What are the types of bevel protector ? With the neat sketch, explain the working of bevel protractor.

Or

14. Explain the construction and working of auto collimator.

Turn over

15. Explain the working principle of tool maker's microscope with the help of neat diagram. Mention its applications.

Or

16. Discuss briefly the surface roughness. Explain the working of any one of the surface measurement with neat sketch.

17. Explain the major and minor diameter measurement for the measuring internal threads.

Or

18. Explain the constant chord method for measuring of gears.

19. Describe the construction of a hydraulic dynamometer and explain how is it used for power measurement.

Or

20. What are the different types of pyrometer? Explain the working of optical pyrometer. Mention its types.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch—Mechanical Engineering

THERMAL ENGINEERING – 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. What are the reasons for losses in IC engines ?

2. What is biological oil ?

3. Define flash point and fire point.

4. What is the function of fuel injection equipment?

5. What are the factors affecting carburetion ?

6. What is meant by knocking ?

7. Write the causes of pre-ignition.

8. What is the significance of Cetane number ?

9. What is the significance of Exhaust Gas Recirculation (EGR) ?

10. What are Thermal Converters ?

(10 × 4 = 40 marks)

Part B

Answer all questions.
Each question carries 12 marks.

11. (a) Explain how actual IC engine cycles differ from air standard cycles.

Or

　　(b) Write the general characteristics of stratified charge engines.

12. (a) Write short note on :

　　　(i) Time Loss Factor ;

　　　(ii) Heat Loss Factor ;

　　　(iii) Exhaust Blow Down.

Or

Turn over

(b)   Explain with neat sketch the working of Simple Carburetor.

13   (a)   (i)   Compare Battery and Magneto Ignition Systems.   (6 marks)

        (ii)   Describe the working of Magneto ignition system.   (6 marks)

Or

(b)   (i)   Write the design and operating factors affecting combustion rate in SI engines.

                                                                                   (6 marks)

        (ii)   What are the types of SI engine combustion chamber ?   (6 marks)

14.   (a)   Explain the process of combustion in CI engine.

Or

(b)   Explain the normal and abnormal combustion with neat sketch.

15.   (a)   Briefly explain the following :—

              (i)   Carbon Monoxide Formation ;

              (ii)   Hydrocarbons Formation ;

              (iii) NO_x formation.

Or

(b)   A Diesel Engine SGR-T4 has a direct fuel system and is turbocharged with an after cooler of using jacket-water. This is used as a stationary engine to drive 550 kW (60 Hz) generators at the speed of 1800 r.p.m. Main specifications of engine are as follows; Engine type 4 stroke, 6 cylinder, water cooled, Turbocharged diesel engine. Bore × stroke 170 mm × 180 mm, Compression ratio r = 14:1, Generator transmission efficiency 90%, η_{mech} 83 %, Fuel consumption 204 g/kW.hr, F/A rate 0.05, Heating value of fuel 44.2 MJ/kg. Calculate (a) Torque, (b) Brake thermal efficiency, (c) BMEP, (d) ISFC, based on sea level condition (1.013 bar and 288K) of the engine (k = 1.4, R = 0.29 kJ/kg.K of air).

                                                                   (5 × 12 = 60 marks)

G 1159

(Pages : 2)

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

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

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch—Mechanical Engineering/Automobile Engineering

HEAT AND MASS TRANSFER (MU)

(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 conduction. State the Fourier's law of heat conduction.

2. Will the thermal resistance of a rectangular slab be increased *or* decreased if :

   (a) the thermal conductivity is increased ?

   (b) the cross sectional area is increased ?

   (c) the thickness of the slab is increased ?

3. Differentiate between forced convection and free convection.

4. Define the following non dimensional numbers :—

   (a) Nusselt number ;

   (b) Reynolds number

5. What is a heat exchanger ? Mention some of its applications ?

6. What is Effectiveness-NTU Method ? When it is used ?

7. State the following laws :—

   (a) Wein's displacement law ;

   (b) Stafan Boltzmann law.

8. Define the following terms :—

   (a) Absorptivity ;   (b) Reflectivity ;

   (c) Transmissivity ;   (d) Emissivity.

9. Define Pick's law of diffusion state.

10. Define Raoult's law.

(10 × 4 = 40 marks)

Turn over

Part B

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

11. (a) Derive the one-dimensional heat conduction equation in a sphere with density ρ, specific heat C and outer radius R.

    Or

    (b) A furnace wall is of three layers, first layer of insulation brick of 12 cm thickness of conductivity 0.6 W/mK. The face is exposed to gases at 870°C with a convection coefficient of 0.6 W/m²K. This layer is backed by a 10 cm layer of firebrick of conductivity 0.8 W/mK. There is a contact resistance between the layers of 2.6×10^{-4} m² °C/W. The third layer is the plate backing of 10 mm thickness of conductivity 49 W/mK. The Contact resistance between the second and third layers is 1.5×10^{-4} m² °C/W. The plate is exposed to air at 30°C with a convection coefficient of 15 W/m² K. Determine the heat flow, the surface temperatures and the overall heat transfer coefficient.

12. (a) Engine oil at 80°C flows over a flat surface at 40°C for cooling purpose, the flow velocity being 2m/s. Determine at a distance 0.4 m from the leading edge the hydrodynamic and thermal boundary layer thickness. Also determine the local and average valus of friction and convection coefficients.

    Or

    (b) Explain the concept of thermal boundary layer over a flat plate with a neat sketch.

13. (a) An economizer in a boiler has flow of water inside the pipes and hot gases on the outside flowing across the pipes. The flow rate of gases is 2,000 tons/hr and the gases are cooled from 390°C to 200°C. The specific heat of the gas is 1005 J/kgK. Water is heated (unser pressure) from 100°C to 220°C . Assuming an overall heat transfer coefficient of 35 W/m² K, determine the area required. Assume that the air flow is mixed.

    Or

    (b) Derive an expression for LMTD for counter flow heat exchanger.

14. (a) A gas turbine combustion chamber can be considered as a cylinder of 0.2 m dia and 0.9 m length. The combustion gases are at 8 atm and 130 K. The partial pressure of CO_2 is 0.8 aim and that of water vapour 0.8 atm. The wells are at 800 K. Determine the heat flux from the gas to the chamber surface.

    Or

    (b) Derive an expression for view between two differential elements.

15. (a) Acetic acid diffuses into a non-diffusing fin of water of 1mm thickness. The concentrations of acid on the opposite sides of the film are 9 and 3% of acid by weight. The diffusivity at this temperature is 0.95×10^{-9} m²/s. Determine the rate of diffusion of the acid. The molecular weight of the acid is 60. The density of the solution with 9% acid is 1012 kg/m³ and for the 3% solution is 1003.2 kg/m³.

    Or

    (b) Explain with neat diagram for pool regimes for an independently controlled surface temperature.

(5 × 12 = 60 marks)

G 1169

(Pages : 2)

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

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

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering / Automobile Engineering

PRINCIPLES OF MANAGEMENT AND ENGINEERING ECONOMICS (MU)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary / Mercy Chance]

Time : Three Hours   Maximum : 100 Marks

Answer Part A and Part B in **separate** *answer-books.*

Answer **all** *questions.*

Part A (Principles of Management)

1. Name the different types of organization structure.

Or

2. Describe the functions of management.

(16 marks)

3. Explain in detail about the types of motivations and its limitations.

Or

4. Explain in detail about the necessity of marketing management.

(17 marks)

5. Explain the principles of TQM.

Or

6. Describe in detail about the formation co-operative sector companies.

(17 marks)

Part B (Engineering Economics)

7. Describe in detail about theory of demand and supply mechanism.

Or

8. Explain any *three* monetary and the fiscal measures to control inflation.

(16 marks)

Turn over

9. Discuss the functions of commercial bank system in Indian economy.

Or

10. Explain the role of RBI in Indian economy.

(17 marks)

11. Discuss the role of multinational companies in Indian economy and their contribution to economic growth.

Or

12. Discuss the role of public sector companies in Indian economy and their contribution to economic growth.

(17 marks)

G 1179   ✓   (Pages : 3)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

COMPUTER AIDED DESIGN AND MANUFACTURING (MU)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours   Maximum : 100 Marks

Answer all questions.
Each question carries 20 marks.

1. (a) Define CAD and CAM. Explain their application in industries.

    (b) Explain the basic principle of DDA algorithm for linear interpolation.

    (c) What is clipping ? Give the details of method used for line clipping.

    (d) Explain about the steps involved in general design process.

                                                 (4 × 5 = 20 marks)

Or

2. (a) Briefly describe any two display devices that are used in CAD/CAM System.

    (b) What are the different co-ordinate systems in CAD ?

    (c) Explain the concept of geometric rotation in XY plane.

    (d) Explain wireframe and surface modeling with suitable sketches.

                                                 (4 × 5 = 20 marks)

3. (a) What is Numerical Control (NC) ? What are the advantages of NC ?

    (b) What are the classifications of NC based on motion control system ?

    (c) Give a brief write-up on rotary encoders used in CNC machine tools.

    (d) Explain about CNC and DNC.

                                                 (4 × 5 = 20 marks)

Or

4. (a) Explain about the basic components of an NC system.

    (b) With block diagram, explain open loop and closed loop control in NC system.

    (c) Explain about the co-ordinate system used in NC.

    (d) What is the need of programmable logic controllers ?

                                                 (4 × 5 = 20 marks)

Turn over

5. (a) Differentiate between manual part programming and Computer aided programming.

(b) Write the G code for the following Operation indicating tool used and spindle speed :

    (i) Linear interpolation.

    (ii) Anticlockwise circular interpolation.

    (iii) Clockwise circular interpolation.

(c) What is the canned cycle ? Give *two* examples.

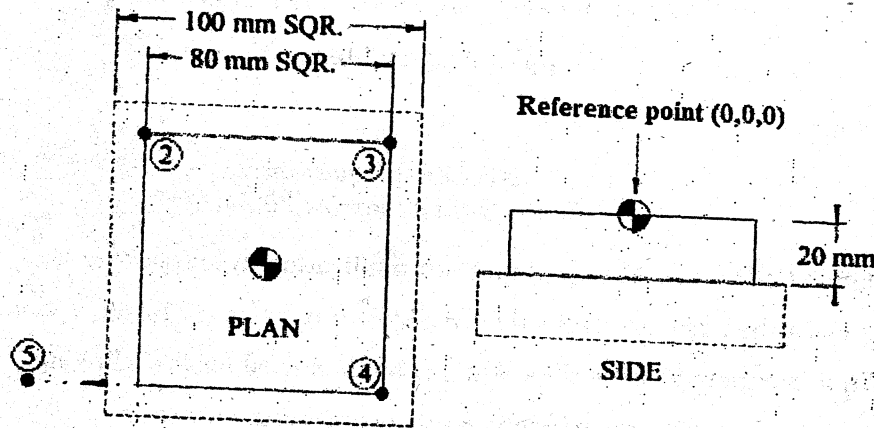(d) Write the CNC program for the work-part shown in Fig. 1.

Fig.1

Or

(4 × 5 = 20 marks)

6. (a) Briefly describe the steps involved in the part programming.

(b) Write a note on tool length compensation.

(c) Write (i) Geometry Statement and ; (ii) Motion Statement for the work-part shown in Fig. 2
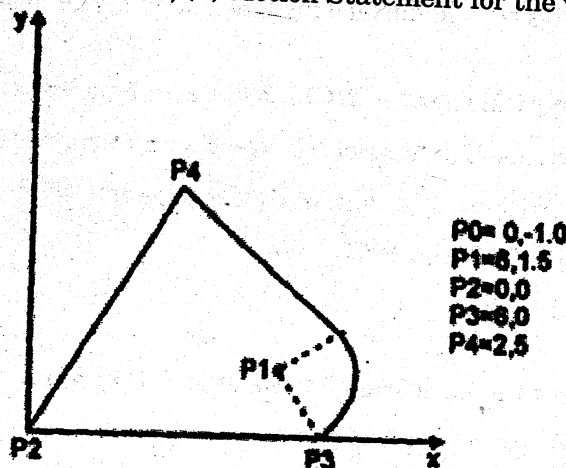

P0= 0,-1.0
P1=6,1.5
P2=0,0
P3=6,0
P4=2,5

Fig. 2

(d) Explain the different Statements used in APT language.

(4 × 5 = 20 marks)

7. (a) Briefly explain the need for Computer aided process planning.

(b) Why is group technology more important in the present manufacturing scenario ?

(c) Explain the role of artificial intelligence in process planning.

(d) Explain about process planning software.

(4 × 5 = 20 marks)

Or

8. (a) Mention the advantages and limitations of group technology.

(b) What are the factors to be considered in selecting a parts coding and structure in group technology ?

(c) Explain about generative process planning System.

(d) What is meant by part family ?

(4 × 5 = 20 marks)

9. (a) Explain about the sensors used in robotics.

(b) What are the industrial applications of robots ?

(c) Write a short note about load carrying capacity of robots.

(d) Describe intelligent robot.

(4 × 5 = 20 marks)

Or

10. (a) Explain about end effectors in robotics.

(b) What are the different methods used for programming robots ?

(c) Briefly explain the robot physical configuration.

(d) What is meant by precision of movement in robotics ?

(4 × 5 = 20 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Automobile Engineering/Mechanical Engineering (AU, ME)

AU 010 601/ME 010 601—MECHANICS OF MACHINES

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Differentiate between Structure, Mechanism and Machine.

2. Define intensitiveness in a governor.

3. Discuss the variation in coefficient of fluctuation of speed.

4. List all the devices/machines working on the principle of gyroscopic couple.

5. Distinguish between Mechanical, Power and Air brakes.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. How will you apply graphical method for force analysis ?

7. Discuss the inertia governors with neat sketches.

8. Explain the stages in drawing a turning moment diagram.

9. With neat sketch, explain the working of a shaft-disc system.

10. Clearly differentiate between a transmission dynamometer and absorption dynamometer, highlighting their fundamental principle.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each question carries 12 marks.

11. Define and explain all the steps in matrix methods for static force analysis.

Or

Turn over

12. Discuss the dynamic force analysis of a slider crank mechanism. Derive expressions for velocities and accelerations in different points of the mechanism.

13. Explain the significance of "controlling force" of a governor. Discuss all the characteristics.

Or

14. Derive an expression for effort of a governor, from fundamentals. What is power of a governor ?

15. Derive an expression for turning moment. Explain the "T-θ" diagram for (i) single cylinder double acting steam engine ; (ii) single-cylinder four stroke engine ; and (iii) multi-cylinder engine.

Or

16. Explain the method for obtaining inertia force in reciprocating engines by graphical method.

17. A uniform disc having a mass of 8 kg. and a radius of gyration of 150 mm. is mounted on one end of a horizontal arm of length 200 mm. The other end of the arm can rotate freely in a universal bearing. The disc is given a clockwise spin of 250 r.p.m. as seen from the disc end of the arm. Determine the motion of the disc, if the arm remains horizontal.

Or

18. Explain all the aspects of stability of a four-wheeled vehicle. Discuss the effect of (i) gyroscopic couple ; and (ii) centrifugal couple.

19. Explain the working of the following :— (i) Internally expanding shoe brake ; and (ii) Centrifugal clutches.

Or

20. Discuss the principle of working of an epicyclic train, belt transmission and torsion dynamometer. Derive expression for effort and power of the dynamometer.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Automobile Engineering/Mechanical Engineering/Production Engineering

AU 010 602/ME 010 602/PE 010 602—HEAT AND MASS TRANSFER (AU, ME, PE)

(Regular/Improvement/Supplementary)

Time : Three Hours   Maximum : 100 Marks

Use of Approved data-book is permitted.
Assume any missing data if required.

Part A

Answer all questions.
Each question carries 3 marks.

1. Define thermal conductivity, thermal resistance and thermal conductance ?

2. Differentiate between mechanisms of heat transfer by free and forced convection.

3. How does a fin enhance heat transfer at a surface ?

4. State Kirchoff's law of radiation ?

5. State the different modes of mass transfer ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Derive the equation for overall thermal resistance to heat flow through multilayer composite cylindrical wall.

7. Distinguish between thermal boundary layer and hydrodynamic boundary layer ?

8. Derive the effectiveness — NTU relationship for a counter flow heat exchanger.

9. Explain Stefan Boltzmann Law.

10. Explain Fick's law of diffussion.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Derive an expression for heat transfer through a composite wall of three layers of different materials.

Or

(b) Two insulation materials A and B, in powder form, with thermal conductivities of 0.005 W/m.-deg and 0.03 W/m.-deg. were purchased for use over a sphere of 40 cm. diameter. Material A was to form the first layer 4 cm. thick and material B was to be the next layer 5 cm. thick. Due to oversight during installation, whole of material B was applied first and subsequently there was a layer formed by material A. Investigate how the conduction heat transfer would be affected.

12. (a) An electrically heated square plate 50 cm. × 50 cm, has one of its surface thermally insulated and the other surface dissipates heat by free convection into atmospheric air at 20°C. The heat flux over the surface of the plate is uniform and results in a mean temperature of 60°C. If the plate is inclined at an angle of 50 degree from the vertical, make calculations for the heat loss from the plate for the heated surface facing up.

Or

(b) Explain in detail the mechanism of free convection? Show by dimensional analysia that problems in heat transfer involving free convection only, the Nusselt number can be expressed as a function of the Prandtl number and Grashof number.

13. (a) A rod of 10 mm. square section and 160 mm. length with thermal conductivity of 50 W/m.-deg protrudes from a furnace wall at 200°C, and is exposed to air at 30°C, with convection coefficient 20 W/m². deg. Make calculations for the heat convected upto 80 mm. and 158 mm. lengths and comment on the result. Adopt a long fin model for the arrangement.

Or

(b) A steam condenser is transferring 250 kW. of thermal energy at a condensing temperature of 65°C. The cooling water enters the condenser at 20°C with a flow rate of 7500 kg./hr. Calculate the log mean temperature difference. If overall heat transfer coefficient for the condenser surface is 1250 W/m.²-deg, what surface area is required to handle this load ? What error would be introduced if the arithmetic mean temperature difference is used rather than the log mean temperature difference ?

14. (a) Explain : (a) intensity of radiation ; (b) Wein's displacement law ; (c) Planck's law ; and (d) Radiosity.

Or

(b) The net radiation from the surface of two parallel plates maintained at temperature T1 and T2 is to be reduced by 79 times. Calculate the number of screens to be placed between the two surfaces to achieve this reduction in heat exchange, assuming the emissivities of the screens on 0.5 and that of the surfaces on 0.8.

15. (a) Discuss in detail the various regimes in boiling and explain the condition for the growth of bubbles. What is the effect of bubble size on boiling ?

Or

(b) Explain two dimensional steady state heat conduction.

B.TECH. DEGREE EXAMINATION MAY 2015

Sixth Semester

Branch : Mechanical Engineering

ME 010 603—THERMAL SYSTEMS AND APPLICATIONS (ME)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. State the differences between boiler mountings and boiler accessories.

2. What is the function of a steam nozzle ?

3. Write the advantages of a gas turbine over a steam turbine.

4. What do you mean by sun tracking system ?

5. Draw the lay out of a diesel power plant.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. State the methods of increasing the thermal efficiency of a rankine cycle.

7. What do you mean by supersaturated flow in steam nozzles ?

8. Write the differences between axial and centrifugal compressors with figures.

9. Write in detail about solar collectors.

10. Explain spreader type stoker in coal combustion.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11 (a) Explain a modern steam generator with a neat diagram.

Or

(b) A vessel having a capacity of 0.85 M^3 contains steam at 12 bar and 0.92 dry. Steam is blown off until the pressure drops to 6 bar. The valve is then closed and the vessel cooled until the pressure is 4 bar. Assuming during the blowing off period, enthalpy per kg of steam remains constant in the vessel, determine (i) the quantity of steam blown off (ii) quantity of steam in the vessel after cooling (iii) quality of steam in the vessel after cooling.

12 (a) Steam expands through a nozzle from 5 bar and dry saturated to a back pressure of 0.2 bar. Mass flow is 2 kg/sec. Calculate the exit and the throat areas under the following conditions :

(i) Isentropic expansion with negligible velocity ; (ii) Isentropic expansion with initial velocity of 100 m/sec ; (iii) Friction loss at any pressure amounts to 10% of the total heat drop upto that pressure and initial velocity negligible.

Or

(b) Derive the expression for maximum blade efficiency in a single stage impulse turbine.

13 (a) Draw the schematic diagram of a simple gas turbine cycle with reheat and explain briefly the working principle. Draw also the p-v and T-s diagrams of the cycle.

Or

(b) Explain briefly about different types of combustion chambers of gas turbines.

14 (a) Describe solar thermal power generation.

Or

(b) Explain the principle of conversion of solar energy into heat.

15 (a) Explain with the help of a detailed layout, operation of a steam power plant.

Or

(b) Explain the following :

(i) Coal burners ; (ii) cooling ponds and towers ; (iii) steam condensers.

(5 × 12 = 60 marks)

G 1220

(Pages : 2)

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

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

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering

AU 010 604
ME 010 604 } METROLOGY AND MACHINE TOOLS (AU, MU)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. What is the difference between Drilling and Boring ?

2. Name different types of Milling Cutters.

3. What do you mean by tapping ?

4. Name any *six* instruments used for angle measurements.

5. Write short notes on laser interferometry.

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. What is the difference between Turret lathe and Capstan lathe ?

7. Briefly explain the methods of honing.

8. What do you meant by gear hobbing ? Name the basic types of hobbing machines.

9. Write short note on gauge blocks.

10. How the Squereness of a drilling machine spindle with table is tested ?

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) With a neat sketch, explain a tool room lathe.

    Or

    (b) Briefly explain a slotter machine using a neat sketch.

12. (a) Briefly explain different methods of milling and nomenclature to specify a milling cutter.

    Or

    (b) What do you mean by Grinding ? Explain various types of grinding machines and how grinding wheels are specified.

13. (a) Explain gear milling and various operations involved in gear milling.

    Or

    (b) Explain any *three* thread production processes.

14. (a) Briefly explain fits and tolerances.

    Or

    (b) What do you mean by comparator ? Explain any *two* types of comparators.

15. (a) Briefly explain surface roughness measurement techniques and terms used for the measurement.

    Or

    (b) Explain any *two* methods used for gear tooth measurement.

(5 × 12 = 60 marks)

B.TECH DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Automobile Engineering/Mechanical Engineering

AU 010 605/ME 010 605—MECHATRONICS AND CONTROL SYSTEMS (AU, ME)

(New scheme—2010 admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each questions carries 3 marks.

1. Define transducer with an example.

2. Explain any *two* type of network systems.

3. Explain openloop control.

4. What is the effect of gain margin in linear control theory.

5. What is the physical significance of order of a system ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each questions carries 5 marks.

6. A thermometer has a time constant 2.5 seconds. It is quickly taken form a temperature 0°C to a liquid bath having a temperature 200°C. Calculate the temperature indicated by the thermometer after a time of 1.5 seconds.

7. Draw a ladder programme for a NAND gate and explain each step.

8. Explain the physical significance of pole position in stability analysis.

9. Write short note on protocols in communication ?

10. Explain the working of a solenoid switch.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. Design a mechatronics system to sort coins. Explain various sensors and actuators requires for this system. Represent the design in block diagram.

Or

12. With the help of symbols explain any four types of pneumatic directional control valves.

13. With the help of a PLC automate a punching process, explain its ladder logic.

Or

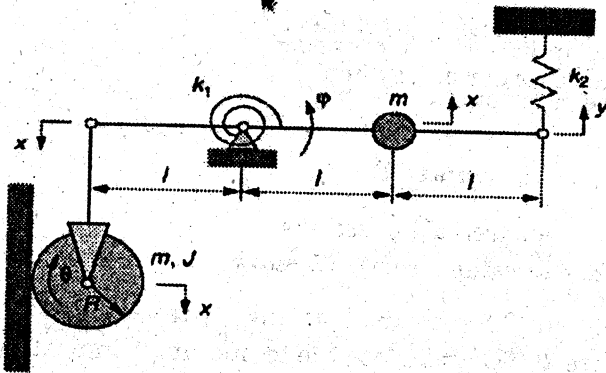14. Explain :

    (i)   Electro mechanical system.
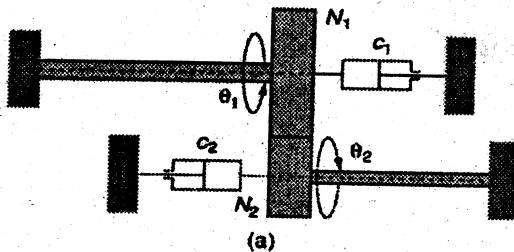
    (ii) Interfacing.

    (iii) Recording of CD.

15. Write the governing equation of the mechanism given below.

Or

16. Derive the transfer function of the given rotating system, take the spring constant of shaft as K.

(a)

17. Analysis the stability of the system and find the values of k for which the system is stable :

    (i) $2S^3 + 6S^2 + k = 0.$

    (ii) $2S^2 + 10S + k + 1 = 0.$

Or

18. A unit feedback system is characterized by an openloop transfer function $G(s) = K/s\,(s + 10)$. Determine the gain K, so that the system will have a damping ratio of 0.5 for this value of K. Determine settling time, peak overshoot for a unit step input.

19. Sketch the Bode plot for the system whose transfer function is $10/\left(s^2 + 6s + 10\right)$.

Or

20. A unit feedback system has an openloop transfer function $G(s) = k/s\left(s^2 + 4s + 13\right)$. Sketch the root locus.

                                               (5 × 12 = 60 marks)

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B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering

ME 010 606 L03—AUTOMOBILE ENGINEERING (Elective I) [ME]

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Write a note on future vehicles.

2. List the classification of prime movers.

3. What are shock absorbers ?

4. Briefly discuss anti-lock braking.

5. What are the advantages of electronic ignition system ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. How will you evaluate vehicle performance ?

7. Discuss the working of fluid coupling.

8. Explain, a steering mechanism with a neat sketch.

9. Discuss a typical drum brake.

10. Explain alternators and voltage regulators.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Discuss all the intake and exhaust systems in engines.

Or

12. What is the significance of resistance to motion of the vehicle ? Explain air, rolling and radiant resistance.

13. Explain any four automatic transmission systems, with neat sketches.

Or

14. Explain : diaphragm clutches, centrifugal clutches, newer fluid couplings and their practical applications.

15. Discuss the different types of coil springs and leaf springs.

Or

16. With neat sketches, expalin hydraulic and gas charged shock absorbers.

17. Explain, with neat sketches and examples :

     (i)   Tubeless tyres.   (4 marks)

    (ii)   Ply ratings.   (4 marks)

   (iii)   Causes of tyre wear.   (4 marks)

Or

18. Discuss the types of chasis and body constructions. Explain the design considerations.

19. Explain all the aspects of automotive air-conditioning system ? How will you improve the efficiency of the system ?

Or

20. How will you test an engine ? Discuss all the steps in preventive and breakdown maintenance.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015

Sixth Semester

Branch : Mechanical Engineering

ME 010 606 L06—PROJECT MANAGEMENT (Elective I) [ME]

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

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

1. What are the important questions raised in technical analysis ?

2. Why does money have time value ?

3. Illustrate the difference between Variance and Semivariance.

4. What steps are involved in PERT analysis ?

5. Write short notes on web enabled project management.

(5 × 3 = 15 marks)

Part B

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

6. What are the components of cost of project ? Discuss them in detail.

7. What is a work schedule ? What purpose does it serve ?

8. What are the Pros and Cons of Monte Carlo simulation ?

9. What is an early start schedule and late start schedule ?

10. Write short notes on PMIS (Project Management Information System).

(5 × 5 = 25 marks)

Part C

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

11. Discuss the five broad phases of capital budgeting.

Or

12. Discuss the importance of considering alternative ways of transforming an idea into a concrete project.

Turn over

13. What is a capital recovery factor ? Illustrate it with an example.

Or

14. (a) What is the relationship between the effective rate of interest and nominal rate of interest ?

   (b) What is the present value of Rs. 2,000 receivable annually for 30 years ? The first receipt occurs after 10 years and the discount rate is 10 percent.

15. Substanciate the issues in the application of Monte-Carlo simulation and the ways and means of resolving them.

Or

16. Describe the three types of Project risk.

17. Consider the optimistic, most likely and pessimistic times for each activity that are given by the following table. Carry out a complete PERT analysis and determine the probability that the project will be completed 3 days earlier to the expected time :

Activity	1–2	1–3	2–4	2–5	3–4	3–6	4–5	4–6	5–7	6–7
a (days)	1	2	5	6	3	4	9	2	9	3
m (days)	5	8	7	9	10	8	11	5	9	6
D (days)	9	20	15	24	17	18	13	14	15	9

Or

18. Determine the least cost schedule for the following project. Overhead cost is Rs. 60 per day :

Activity	1–2	2–3	3–4	3–5	4–5
Normal duration (days)	5	4	6	4	3
Crash duration (days)	3	2	3	1	2
Cost of crashing/day	30	20	40	30	60

19. Explain the various features and facilities in MS Project 2010 Software.

Or

20. Briefly discuss regarding computer aided project management and improvements in this area using new software developments.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Eighth Semester

Branch : Automobile Engineering/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 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. A plate clutch has 3 discs on the driving shaft and 2 discs on the drive shaft, providing 4 pairs of contact surfaces. The OD of contact surface is 240 mm and ID is 120 mm. Assuming uniform pressure and $\mu = 0.3$, find the total spring load for pressing the plates together to transmit 25 KW at 1575 r.p.m. If there are 6 springs each of stiffness 13 KN/m and each of contact surfaces have worn away by 1.25 mm, find the power that can be transmitted, assuming uniform wear.

2. A single block brake, the diameter of drum is 250 mm and the angle of contact is 90°, the operating force of 700 N is applied at the end of lever which is at 250 mm from the centre of the brake block. Determine the torque that may be transmitted. Fulcrum is at 200 mm from the centre of brake block with an offset of 50 mm from the surface of contact. The coefficient of friction is 0.35.

3. A ball bearing is operating on work cycle of 3 hours consisting of :

    (i) A radial load of 3 kN at 1440 r.p.m. for one quarter cycle.

    (ii) A radial load of 5 kN at 720 r.p.m. for half cycle.

    (iii) A radial load of 2.5 kN at 1440 r.p.m. for the remaining cycle.

    (iv) The expected life of the bearing is 10,000 hours.

   Calculate the load carrying capacity of the bearing.

4. The following data is given for 360° hydrodynamic journal bearing :

l/d	1
n	1350 r.p.m
Journal diameter	100 mm
Diametral clearance	100 μm
External load	9 kN

The value of minimum film thickness variable is 0.3. Find the viscosity of oil that needs to be used.

Part B (Module 3 and 4)

5. Design the layout of a 12 speed gear box for a milling machine having an output of speeds ranging from 100 to 1200 r.p.m. Power is applied to the gear box from a 5 kW induction motor at 1440 r.p.m. Choose standard step ratio and construct the speed diagram. Decide upon the various reduction ratios and number of teeth on each gear wheel. Sketch the arrangement of the gear box.

6. Design a single cover butt joint between two plates each of width 200 mm, if the thickness of one plate is 16mm and the other 12 mm. The joint has to transfer a design load of 250 kN. Use bearing type bolts of grade 4.6. Use 10mm thick cover plates.

7. A helical gear speed up drive is required to drive a centrifugal compressor running at 3000 r.p.m. The helical gear speed up unit is driven by an electric motor running at 1000 r.p.m. The compressor requires a nominal input power of 12.5 KW. The helix angle of 25° may be assumed for the gears. Standard involute profile 20° full depth system will be used for the gear teeth. The gear pair is required to last for at least 10,000 hours. Design the gear drive for the following materials. Pinion : Heat treated cast steel, Gear: High grade cast iron.

8. A vertical four stroke C.I. engine has following specifications brake power – 4.5 KW speed – 1200 r.p.m. indicated mean effective pressure – 0.35 N/mm² mechanical efficiency – 70% determine dimensions of the cylinder.

(4 × 25 = 100 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Eighth Semester

Branch : Mechanical Engineering/Automobile Engineering

AU 010 802/ME 010 802—OPERATION 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. Identify the difference between production and operations management.

2. What do you mean by bill of material structure ? Give an example.

3. Differentiate between Scheduling and Sequencing.

4. Define maintenance. What are the various types of maintenance ?

5. What are the objectives of supply chain management ?

(5 × 3 = 15 marks)

Part B

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

6. Describe the *three* measures of forecast errors.

7. Write short notes on DRP.

8. Differentiate between Flow shop scheduling and Job shop scheduling with suitable example.

9. Distinguish between individual and group replacement policies.

10. Describe the major elements and features of FMS.

(5 × 5 = 25 marks)

Part C

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

11. Define forecasting. Explain various qualitative and quantitative methods of forecasting methods in detail.

Or

Turn over

12. The data shown in the table include the no. of accidents for the company over the past six years :

Year	2008	2009	2010	2011	2012	2013
No. of employees (in 1000's)	15	12	20	30	32	37
No. of accidents	5	20	15	17	30	35

(i) Develop a linear regression equation and forecast the no. of accidents when the no. of employees is 33,000.

(ii) What is the standard deviation of regression and correlation coefficient ?

13. What is aggregate planning ? What are its objectives ? Explain transportation model for aggregate planning.

Or

14. Explain with flowchart a typical MRP model. Discuss with example.

15. Using Johnson's Algorithm find the optimal sequence and corresponding make span of the 3 machine 5 job Flow shop problem :

Job	Processing time (hours)		
	Machine 1	Machine 2	Machine 3
1	11	10	12
2	13	8	20
3	15	6	15
4	12	7	19
5	20	9	7

Also find the idle time on each machines.

Or

16. Two jobs are processed through five machines A, B, C, D and E with the following technological ordering. Processing time on each machine also given (in hours). Find the minimum elapsed time for both jobs and also the idle time for both the jobs :

Job 1	Sequence	A – B – C – D – E
	Time (hours.)	4 3 6 2 7
Job 2	Sequence	C – B – E – D – A
	Time (hours.)	6 3 5 3 7

17. (i) Define Reliability. Bring out the significance of the important elements in the reliability definition.

(4 marks)

(ii) A hydraulic system is composed of four components having the following failure rates : $\lambda_1 = 0.001, \lambda_2 = 0.005, \lambda_3 = 0.0007$ and $\lambda_4 = 0.0025$ fractional failures per day. Find the reliability of the system for a period of 25 days. What is the system's MTTF ?

(8 marks)

Or

18. Write short notes on the following :

(i) TPM.

(ii) Bath tub curve of failure.

(iii) Measures of maintenance performance.

(iv) FMECA.

(3 + 3 + 3 + 3 = 12 marks)

19. Write short notes on the following :

(i) Lean Manufacturing.

(ii) Kanban System.

(iii) Just in time manufacturing.

(4 + 4 + 4 = 12 marks)

Or

20. Explain the objective of supply chain management. What are the drivers to supply chain performance ? Explain.

[5 × 12 = 60 marks]

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

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B.TECH. DEGREE EXAMINATION, NOVEMBER 2016

Eighth Semester

Branch : Mechanical Engineering

ME 010 803—PRODUCTION ENGINEERING (ME)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 3 marks.

1. Why BUE on a cutting tool is undesirable ?

2. List the beneficial effects of using cutting fluids.

3. What do you mean by micromachining ? List some processes for micromachining.

4. What do you mean by critical fiber length ?

5. What do you mean by non-traditional machining ?

(5 × 3 = 15 marks)

Part B

Answer all questions.
Each question carries 5 marks.

6. Draw the card model of chip formation and estimate the shear strain.

7. Differentiate between flank wear and crater wear with neat sketches.

8. Differentiate between HIP and CIP.

9. Write short notes on imperfections in ceramics.

10. Briefly explain the LIGA process.

(5 × 5 = 25 marks)

Part C

Answer all questions.
Each full question carries 12 marks.

11. Discuss different forces involved in orthogonal cutting. What are the basic assumptions in the Merchant's model ?

Or ·

Turn over

12. Discuss the significance of the different elements of geometry of a single point cutting tool.

13. Briefly explain the characteristics of following tool materials (i) HSS ; (ii) Cemented carbides ; (iii) CBN.

Or

14. Derive the expression for optimum cutting speed and optimum tool life.

15. What do you mean by sintering ? Explain the mechanism of sintering.

Or

16. Distinguish between MRF and MRAFF process.

17. Draw the phase diagram of $MgO—Al_2O_3$ and explain the salient points.

Or

18. Explain the classification of composites with suitable examples.

19. Discuss the following rapid prototyping processes (i) Laminated object manufacturing ; (ii) Fused deposition modelling.

Or

20. With a neat sketch, explain the working principle of EDM. Discuss the effect of different parameters of EDM on MRR and surface finish.

$(5 \times 12 = 60$ marks$)$