

**B.TECH. DEGREE EXAMINATION, MAY 2016****Sixth Semester**

Branch : Mechanical Engineering

**MECHANICS OF MATERIALS (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 is Saint Venant's principle ?
2. Briefly explain the significance of boundary conditions.
3. Differentiate between "stress invariant" and "strain invariant".
4. How will you determine principal strain ?
5. State the application of determining strain components in polar co-ordinates.
6. Sketch and briefly explain any *two* cases of symmetrical stress distribution.
7. Write a note on long cylinders.
8. How will you determine stress distribution in a spherical shell ?
9. Sketch and explain the various loads, stresses and reactions in a c-clamp.
10. Derive an expression for strain energy for a curve beam.

(10 × 4 = 40 marks)

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

11. What is a "stress function" ? Discuss its importance. Derive the compatibility equations for stresses and strains.

*Or*

12. A bar of length 25 cm. has varying cross-section. It carries a load of 14 kN. Find the extension if the cross-section is given by  $(6 + x^2/100)$  cm.<sup>2</sup>, where  $x$  is the distance from one end in cm. Take  $E = 200$  GPa (neglect weight of bar).

**Turn over**

13. The principal stresses at a point in a material are  $40 \text{ MN/m}^2$  tensile and  $60 \text{ MN/m}^2$  compressive. Calculate the normal, shear and resultant stresses on a plane at  $30^\circ$  with the plane of the given tensile normal stress.

Or

14. Derive the relations between (i) Volumetric strain and principal strains ; (ii) Volumetric strain and principal stresses ; and (iii) Elastic constants (E, G, K and  $\mu$ ).
15. Derive the expressions for all the strain components in polar co-ordinates. Discuss their effect on an isotropic material.

Or

16. Determine the stress at inner radius due to centrifugal force in a rotor having an outer radius of 66 cm. with a radius of 10 cm. for the inner hole. The rotor is cut by slots 26 cm. deep at its periphery for winding which has the same mass as the mass of the material removed. The rotor revolves at 1800 r.p.m. Take  $\mu = 0.3$  and  $\rho = 7500 \text{ kg/m}^3$ .
17. A compound cylinder is made of two tubes shrunk on each other, with outer diameter as 20 cm., inner diameter as 10 cm., and common diameter as 15 cm. Find the pressure at the common surface due to shrinkage if the hoop stress at the inside of the outer tube is to be equal to the hoop stress at the inside of the inner tube under an internal pressure of 1000 bar. What is the maximum hoop stress ?

Or

18. A steel hub with external radius 12.5 cm. and internal radius of 7.5 cm. is shrunk on a steel shaft with internal radius 7.505 cm. Find the maximum hoop stress in the hub, contact pressure and the final radius of the surface in contact. Take  $E = 200 \text{ GN/m}^2$  and  $\mu = 0.25$ .
19. From fundamentals, derive an expression for bending stress for curved beams of large curvature.

Or

20. A beam of square section is subjected to uniform bending moment 660 N-m. If the cross-section of the beam is 4 cm.  $\times$  4 cm., find for each of the following cases, the maximum tensile and compressive stresses in the section :

- (i) The beam is straight.
- (ii) The beam is curved to a radius of 20 cm. along the centroidal axis and bending moment increases the curvature.

(5  $\times$  12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016**

**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. Differentiate precision and accuracy.
2. Briefly explain the term calibration.
3. Write a note on wringing of gauge blocks.
4. What is meant by circularity and roundness?
5. Discuss the first order and second order surface irregularities.
6. Define CLA index.
7. Define machine vision.
8. Why laser is preferred in engineering metrology?
9. What is the need of wheat stone bridge in strain gauge?
10. Mention the advantages of CMM.

(10 × 4 = 40 marks)

**Part B**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain the various types of errors that are occurred during measurement.

*Or*

12. What are the characteristics of a good comparator? Explain the construction and working of a mechanical-optical comparator with neat sketch. Mention its advantages.

**Turn over**

13. Explain the construction and working of sine bar with the help of neat diagram. Mention its advantages.

*Or*

14. Write notes on interferometer. Explain the working principle of an optical flat to check the flatness.
15. What is SEM? Explain the working principle of SEM with the help of neat diagram. Mention its advantages over TEM.

*Or*

16. Briefly discuss the factors affecting the surface roughness. Explain the working of any *one* of surface roughness measurement. Mention its advantages and disadvantages.
17. Explain the working of Parkinson's gear testing machine with the help of neat sketch.

*Or*

18. Explain with the neat sketch of Base tangent method for checking the tooth thickness.
19. Explain the temperature measurement using thermocouple.

*Or*

20. What is strain gauge? Briefly explain the working of different types of strain gauge. Define load cells and mention its types.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****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. Explain the reasons for adopting CAD in an engineering organization.  
(b) Explain about the input devices used in CAD/CAM.  
(c) Write Bressnham's circle drawing algorithm.  
(d) Comment on various CAD software packages.

(4 × 5 = 20 marks)

*Or*

2. (a) Explain the concept computer integrated manufacturing (CIM).  
(b) Differentiate between wire frame modeling, surface modeling and solid modeling.  
(c) Briefly explain the various graphic transformations required for manipulating the geometric information.  
(d) Briefly describes the types of storage devices used in CAD/CAM.

(4 × 5 = 20 marks)

3. (a) Explain about the drive systems in numerical control (NC).  
(b) What are the advantages and disadvantages of numerical control system ?  
(c) In what way PLC, Microcomputer and Microcontroller are different than each other ? Suggest their specific applications in manufacturing.  
(d) Explain open loop and closed loop control in NC system.

(4 × 5 = 20 marks)

*Or***Turn over**

4. (a) Explain CNC and DNC systems. What are the advantages of these systems ?
- (b) Explain the basic types of motion controls in NC system.
- (c) Write a short note about DDA integrator and interpolator.
- (d) Briefly describes the feedback devices in NC.

(4 × 5 = 20 marks)

5. (a) List any *five* G codes used in CNC programming with their functions.
- (b) What is meant by manual part programming ? What are its disadvantages ?
- (c) Explain the different statements used in APT language.
- (d) Write the CNC program for the work-part shown in Fig. 1.

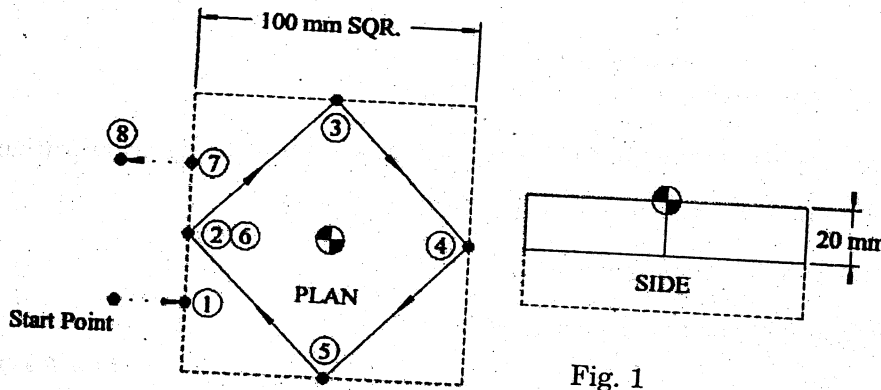


Fig. 1

Or

(4 × 5 = 20 marks)

6. (a) Explain preparatory and miscellaneous functions with examples.
- (b) What is meant by cutter radius compensation ?
- (c) Explain about computer aided part programming and its advantages.
- (d) Write the CNC program for the work-part shown in Fig. 2 :

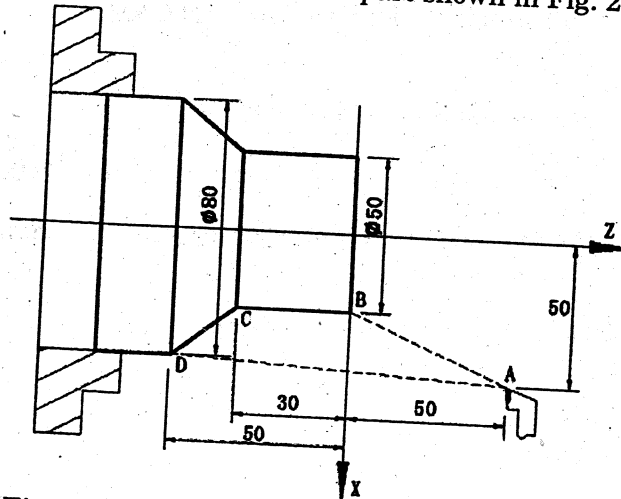


Fig. 2

(All dimensions are in mm)

(4 × 5 = 20 marks)

7. (a) What are the basis code structures used in group technology applications ?  
(b) Differentiate between traditional and automated process planning.  
(c) What is meant by part family and machine cell ?  
(d) Explain about generative process planning system.

(4 × 5 = 20 marks)

*Or*

8. (a) What are the benefits of CAPP ?  
(b) Discuss about various process planning software.  
(c) With block diagram, briefly explain retrieval CAPP system.  
(d) What is the role of artificial intelligence in process planning ?

(4 × 5 = 20 marks)

9. (a) Explain about end effectors in robotics.  
(b) Write a short note on robotic programming languages.  
(c) Briefly explain about different robot configuration.  
(d) Explain about intelligent robot.

(4 × 5 = 20 marks)

*Or*

10. (a) Explain about the sensors used in robotics.  
(b) What are the applications areas for industrial robots ?  
(c) Explain the technical features of robots :  
(i) Precision of movement ; (ii) Weight carrying capacity.  
(d) Describe about the vision system of Robots.

(4 × 5 = 20 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****Sixth Semester**

Branch : Automobile Engineering / Mechanical Engineering

AU 010 601/ME 010 601—MECHANICS OF MACHINES (AU, 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. Explain the conditions required for a plane mechanism is to be in static equilibrium.
2. What is the fundamental difference between a *governor* and a *flywheel* ?
3. Explain the term crank effort.
4. What is the magnitude of gyroscopic couple when the ship rolls about its propeller axis ?
5. What is the fundamental difference between a brake and a dynamo meter.

(5 × 3 = 15 marks)

**Part B**

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

6. Define and explain the superposition theorem as applicable to a system of forces, why it fail in a system having frictional forces.
7. What is meant by effort and power of a governor ? Find the expression for power in any governor.
8. What are turning moment diagrams ? Why are they drawn ?
9. What do you mean by gyroscopic couple ? Derive a relation for its magnitude ?
10. What is meant by self locking and self energised brake.

(5 × 5 = 25 marks)

**Part C**

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

11. The dimensions of a four link mechanism are : AB = 40 mm, BC = 600 mm, CD = 500 mm, AD = 900 mm, and  $\angle DAB = 60^\circ$ . AD is the fixed link. E is the point on link BC such that BE = 400 mm and CE = 300 mm (BEC clockwise). A force of  $150 \angle 45^\circ$  N acts on DC at a distance

**Turn over**



of 250 mm from D. Another force of magnitude  $100 \angle 180^\circ$  acts at point E. Find the required input torque on link AB for static equilibrium of the mechanism.

Or

12. The piston diameter of an internal combustion engine is 125 mm and the stroke is 220 mm. The connecting rod is 4.5 times the crank length and has a mass of 50 kg. The mass of the reciprocating parts is 30 kg the centre of mass of the connecting rod is 170 mm from the crank pin centre and the radius of gyration about an axis through the centre of mass is 148 mm. The engine runs at 320 r.p.m. Find the magnitude and the direction of the inertia force and the corresponding torque on the crankshaft when the angle turned by the crank is  $140^\circ$  from the inner dead centre.
13. In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of the sleeve, whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 200 mm and 300 mm of rotation of the governor balls ?

Or

14. In a spring controlled gravity governor, the mass of each ball is 1.6 kg. Distance of fulcrum from the axis of rotation is 60 mm. The bell crank lever has a vertical arm of 120 mm long and a horizontal arm 50 mm long. The mass of the sleeve is 6.5 kg. The sleeve begins to rise at 200 r.p.m. and the rise of sleeve for 5% increase is 9 mm. Determine the initial thrust in the spring and its stiffness.
15. A machine is coupled to a two stroke engine which produces a torque of  $(800 + 180 \sin 3\theta)$  Nm where  $\theta$  is the crank angle. The mean engine speed is 400 r.p.m. The flywheel and the other rotating parts attached to the engine has a mass of 350 kg at a radius of gyration of 220 mm. Calculate :
- The power of the engine ;
  - The total fluctuation of speed of the flywheel when the resisting torque is  $(800 + 80 \sin \theta)$  Nm.

Or

16. The turning moment diagram of a four stroke engine is assumed to be represented by four triangles, the areas of which form the line of zero pressure are :
- Suction stroke =  $440 \text{ mm}^2$
  - Compression stroke =  $1600 \text{ mm}^2$
  - Expansion stroke =  $7200 \text{ mm}^2$
  - Exhaust stroke =  $660 \text{ mm}^2$

Each  $\text{mm}^2$  of area represents 3 Nm of energy. If the resisting torque is uniform, determine the mass of the rim of flywheel to keep the speed between 218 and 222 r.p.m. when the mean radius of the rim is to be 1.25 m.

17. The total mass of a four wheeled racing car is 1800 kg. The car is having a wheel base of 1.6 m and rounds a curve of 24 m radius at 36 km/hr. The road is banked at  $10^\circ$ . The external diameter of the wheel is 600 mm and each pair with axle has a mass of 180 kg with radius of gyration of 240 mm. The height of the centre of mass of the car above the wheel base is 950 mm. Determine the pressure on each rail allowing for centrifugal force and gyroscopic couple actions.

*Or*

18. A disc with radius of gyration 60 mm and a mass of 4 kg is mounted centrally on a horizontal axle of 80 mm length between the bearings. It spins about the axle at 800 r.p.m. counter clockwise when viewed from the right hand side bearing. The axle processes about a vertical axis at 50 r.p.m. in the clockwise direction when viewed from above. Determine the resultant reaction at each bearing due to the mass and gyroscopic effect.
19. A vehicle moves on a road that has a slope of  $15^\circ$ . The wheel base is 1.6 m and the centre of mass at 0.72 m from the rear wheels and 0.8 m above the inclined plane. The speed of the vehicle is 45 km/hr. The breaks are applied to all the four wheels and the coefficient of friction is 0.4. Determine the distance moved by the vehicle before coming to rest and the time taken to do so if it moves :
- (a) Up the plane ;
  - (b) Down the plane.

*Or*

20. In a belt transmission dynamo meter, the driving pulley rotates at 300 r.p.m. The distance between the centre of the driving pulley and the dead mass is 800 mm. The diameter of each of the driving as well as intermediate pulleys is equal to 360 mm. Find the value of the dead mass required to maintain the and the lever in a horizontal position when the power transmitted is 3 kW. Also, find its value when the belt just begins to slip on the driving pulley, being 0.25 and the maximum tension in the belt 1200 N.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****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. Draw  $p-v$ ,  $T-s$  and  $h-s$  diagrams for an ideal Rankine cycle.
2. What is the significance of critical pressure ratio on discharge through the nozzle?
3. What are the applications of Gas turbine?
4. Define overall loss coefficient for a solar collector.
5. Explain the concept of draught.

(5 × 3 = 15 marks)

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

6. Distinguish between mountings and accessories of the boiler. Name any two mountings and two accessories.
7. What is meant by governing of steam turbines? Give the different methods for governing in steam turbines.
8. Describe with neat sketch the working of a simple constant pressure closed cycle gas turbine.
9. Describe the working of solar power plant.
10. What are the advantages and disadvantage of a thermal power plant?

(5 × 5 = 25 marks)

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

11. Draw a schematic diagram of a water tube boiler. Clearly mark the position of the economiser and superheater in the boiler and indicate the path of the flue gases.

Or

**Turn over**

12. A steam power plant operates on an ideal reheat Rankine cycle between the pressure limits of 9 MPa and 10 kPa. The mass flow rate of steam through the cycle is 25 kg/s. Steam enters both stages of the turbine at 500°C. If the moisture content of the steam exiting the low pressure turbine should not to exceed 10%, determine (a) the reheat pressure ; (b) thermal efficiency of the cycle.
13. A steam turbine develops 190 kW with a consumption of 18 kg/kWh. The pressure and temperature of steam entering the nozzle are 11.8 bar and 220°C, respectively. The steam leaves the nozzles at 1.18 bar. The diameter of nozzle at the throat is 8 mm. find the number of nozzles. If 8 % of enthalpy drop is lost due to friction in diverging part of the nozzle, determine the diameter at the exit of the nozzle and exit velocity of leaving steam.

*Or*

14. What do you understand by supersaturation of steam flowing through nozzles ? Explain the phenomenon and factors responsible for it.
15. Discuss briefly the methods employed for improving the performance of open cycle gas turbine plant.

*Or*

16. A single-acting, single cylinder reciprocating air compressor has a cylinder diameter of 200 mm and a stroke of 300 mm. Air enters the cylinder at 1 bar and 27°C. It is then compressed polytropically to 8 bar according to the law  $pV^{1.3} = \text{constant}$ . If the speed of the compressor is 250 r.p.m., calculate the mass of air compressed per minute, and the power required in kW for driving the compressor.
17. Explain the principle of conversion of solar energy to heat. Describe a flat plate solar collector.

*Or*

18. With the help of a neat sketch, explain the working of a solar water heater.
19. Discuss various dust and ash handling systems of a power plant.

*Or*

20. What are the elements of coal handling system in a thermal power plant ? Explain.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****Sixth Semester**

Branch : Mechanical Engineering/Automobile 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 Trepanning ?
2. With a sketch, show rake angle of milling cutter.
3. Write a note on gear errors.
4. Illustrate principle of sine bar.
5. How Ra value is calculated for a surface roughness profile ?

(5 × 3 = 15 marks)

**Part B**

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

6. Write a note on broaching tool.
7. How drilling is different from boring ?
8. Describe the nomenclature of hob.
9. A 50 mm long pin having diameter  $20 \pm 0.02$  mm, will be electroplated for a thickness of  $50 \pm 5$   $\mu$ m. Estimate the size of a GO limit gauge, neglecting the gauge to tolerances.
10. Write the importance of cut-off length in roughness measurement.

(5 × 5 = 25 marks)

**Part C**

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

11. Describe the thread cutting mechanism in Lathe.

*Or*

12. Write a note on cutting tool materials use on conventional machining processes.

**Turn over**

13. Explain cylindrical, surface and form grinding processes.

*Or*

14. How honing, lapping and burnishing processes differ in its features ?

15. Write a note on hobbing techniques.

*Or*

16. Illustrate thread whirling and thread grinding processes.

17. Explain the three basic kinds of fits based on hole basis system.

*Or*

18. Describe the working of a typical pneumatic comparator to check the roundness of bore of a cylinder.

19. Describe the importance of apparent and real area of contact in mating surface, by taking any two typical industrial examples.

*Or*

20. Sketch a typical CMM and write the features.

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****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)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

*Use of approved data books is permitted.  
Assume any missing data if required.*

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

1. Discuss the mechanism of heat conduction in solids and gases.
2. Define Prandtl Number. What is its physical significance?
3. Explain Reynolds-Courlburn analogy.
4. Define effectiveness of a heat exchanger.
5. Explain Fick's law of diffusion.

(5 × 3 = 15 marks)

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

6. Explain critical radius of insulation.
7. Explain the significance of dimensionless numbers in forced convection.
8. Explain the laws of radiation.
9. Discuss the classification of heat exchangers.
10. Discuss the finite difference method of solving 2 dimensional steady-state heat conduction problem without heat generation through a rectangular slab.

(5 × 5 = 25 marks)

**Turn over**

## Part C

Answer all questions.

Each question carries 12 marks.

11. Derive an expression for the temperature distribution in a cylinder of radius  $r_0$  with uniform heat generation  $q$  and constant surface temperature  $T_w$ .

Or

12. A 1 m. long steel plate is well insulated on its sides, while the top surface is at  $100^\circ\text{C}$ . and the bottom surface is convectively cooled by a fluid at  $20^\circ\text{C}$ . Under steady-state condition without heat generation, a thermocouple at the mid-point of the plate reveals a temperature of  $85^\circ\text{C}$ . What is the value of the heat transfer coefficient at the bottom surface ?

13. By conducting the dimensional analysis obtain a relation connecting the various dimensionless numbers in forced convection heat transfer along a flat plate.

Or

14. Engine oil at a rate of  $0.02\text{ kg/s}$  flows through a  $3\text{ mm}$ . diameter tube  $30\text{ mm}$ . long. The oil has an inlet temperature of  $60^\circ\text{C}$ . while the tube wall temperature is maintained at  $100^\circ\text{C}$ . by steam condensing on its outer surface. Estimate the outlet temperature of the oil and the average heat transfer coefficient for internal flow of the oil.

15. Obtain an expression for the temperature distribution in a rectangular fin of uniform cross-sectional area and tip insulated boundary condition. Also derive expressions for fin efficiency and fin effectiveness.

Or

16. Derive an expression for the effectiveness of counter flow heat exchanger as a function of NTU and capacity ratio.

17. Two parallel disks, each  $1\text{ m}$ . in diameter are spaced  $25\text{ cm}$ . apart. One disk is maintained at  $200^\circ\text{C}$ . while the other disk is insulated on the back side. Both disks have an emissivity of  $0.5$  and are placed in a large room which is maintained at  $30^\circ\text{C}$ . Calculate the radiation energy lost by the  $300^\circ\text{C}$  disk.

Or

18. A thermometer having an emissivity of  $0.9$  reads  $20^\circ\text{C}$ . in a room whose walls are at a temperature of  $5^\circ\text{C}$ . Calculate the true air temperature taking  $h$  for the thermometer as  $8.3\text{ W/m}^2/\text{K}$ .

19. An open pan  $15\text{ cm}$ . in diameter and  $7.5\text{ cm}$ . deep contains water at  $25^\circ\text{C}$ . and is exposed to atmospheric air at  $25^\circ\text{C}$ . and  $50\%$  relative humidity. Calculate the evaporation rate of water.

Or

20. Derive an expression for the isothermal evaporation of water from a surface and its subsequent diffusion through a stagnant air layer above.

(5 × 12 = 60 marks)



**B.TECH. DEGREE EXAMINATION, MAY 2016****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

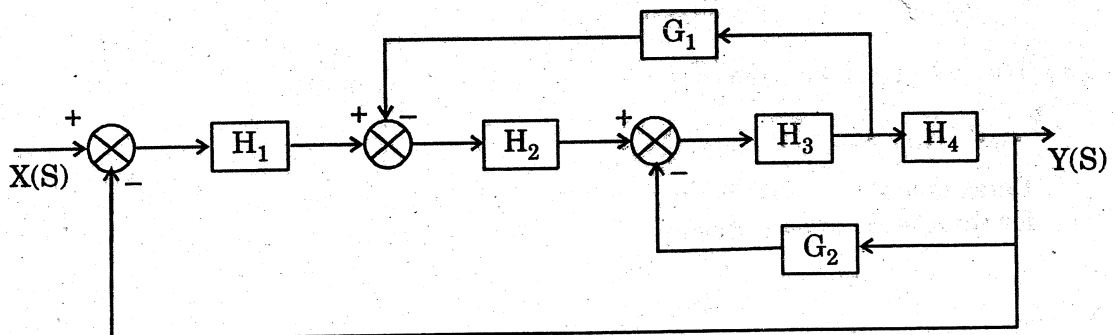
**Part A***Answer all questions.**Each question carries 3 marks.*

1. What are the elements of data presentation systems ?
2. Explain the function of a peripheral interface adapter.
3. Distinguish between open loop and closed loop control system.
4. What is meant by velocity lag ?
5. Mention the significance of order of a system.

(5 × 3 = 15 marks)

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

6. What is meant by sequential control ? Explain with an example.
7. What are the advantages of using external Interrupts rather than software polling as a means of communication with peripherals ?
8. For the system shown in figure, find the overall transfer function using block diagram reduction.

**Turn over**

9. What do you mean by Protocols in communication ? Explain with examples.  
 10. Explain the effect of gain margin in linear control theory.

(5 × 5 = 25 marks)

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

11. Design a summing amplifier circuit that can be used to produce an output that ranges from - 1 to 15V when the input goes from 0 to 100 mV.

*Or*

12. You are offered a choice of an incremental shaft encoder or an absolute shaft encoder for the measurement of an angular displacement. Explain the principal difference between the results that can be obtained by these methods?

13. Explain the two types of multiple access control used with LANs.

*Or*

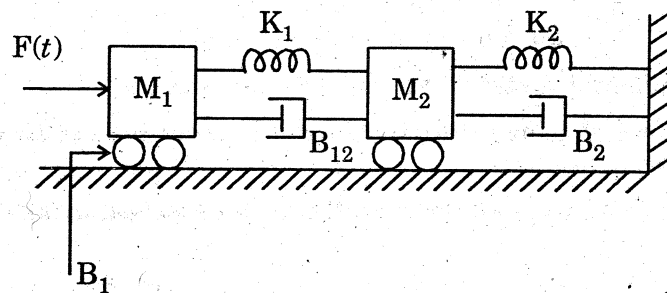
14. Explain what is meant by :

(a) Replication checks ; (b) Expected value checks ; (c) Reversal checks and (d) Parity checks.

15. Explain how a servomotor is interfaced with 8051 microcontroller for the control of angle in the servomotor.

*Or*

16. Explain the governing equator for the following mechanical system :



17. The characteristic equation of a servo system is given by :

$$a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0.$$

Determine the condition which must be satisfied by the coefficients of the characteristic equation for the system to be stable.

*Or*

18. The open loop transfer function of a unity feedback control system is given by :

$$G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$$

By applying Routh criterion, discuss the stability of the closed loop system as a function of K. Determine the values of K which will cause sustained oscillations in the closed loop system. What are the corresponding oscillation frequencies ?

19. Write a note on experimental determination of frequency response.

*Or*

20. Find the roots of the following polynomial by use of the root locus method :

$$3s^4 + 10s^3 + 21s^2 + 24s + 30 = 0.$$

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, MAY 2016****Sixth Semester**

Branch : Mechanical Engineering

ME 010 606 L03—AUTOMOBILE ENGINEERING (Elective I) (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 any three classifications of engines.
2. What is the function of a Gear box in an automobile ?
3. Differentiate between toe in and toe out.
4. What do you mean by ABS ?
5. What is the need for an electrical system in an SI engine ?

(5 × 3 = 15 marks)

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

6. What do you mean by CRDI? How does it improve the efficiency of the engine ?
7. With a neat sketch explain the working of a universal joint.
8. Explain the working of a gas charged shock absorber.
9. Sketch the layout of a hydraulic braking system
10. What is a Bendix drive ?

(5 × 5 = 25 marks)

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

11. Explain the various types combustion chambers used in IC engines.

*Or*

12. Explain rolling resistance, air resistance and grade resistance with respect to a moving vehicle. What do you mean by gradability of a vehicle ?

Turn over

13. What is the function of a clutch ? Explain the working of a centrifugal clutch with a neat sketch.

*Or*

14. Explain the working of a differential ? Explain the differential action when the wheel is on a slippery ground ?

15. What is the function of a steering gear box ? Explain any two types.

*Or*

16. What is the necessity of wheel balancing and wheel alignment ? What is the importance of king pin inclination ?

17. Explain the working of a pneumatic braking system. What are its advantages ?

*Or*

18. Explain the different causes of tyre wear. How are tyres classified based on ply arrangements ?

19. Explain the working of a battery ignition system circuit. Compare it with electronic ignition system.

*Or*

20. What is engine testing ? Explain the steps in preventive and breakdown maintenance.

(5 × 12 = 60 marks)

**G 1501**

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2016**

**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. Explain about environment impact analysis.
2. What is payback period ? Explain with an example.
3. Explain briefly about decision trees.
4. Discuss about resource allocation.
5. Explain the features of any one PM software.

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Explain the characteristics of project with an example.
7. Discuss about the means of project finance.
8. Explain the major measures of project risk.
9. List out and explain the procedural steps in crashing.
10. What are the reports generated from Project 2010 ? Explain their uses.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Discuss about 7-S of project management.

*Or*

12. Explain the procedural steps in financial analysis.

**Turn over**

13. List out and explain discounting and non-discounting criteria techniques used for project evaluation.

Or

14. Using following data, find the cost benefit ratio and net present value :

Year	Cash flow (in Rs.)
0 ...	3,60,000
1 ...	70,000
2 ...	70,000
3 ...	70,000
4 ...	70,000
5 ...	80,000
6 ...	80,000
7 ...	80,000
8 ...	70,000

15. Explain any *two* measures of break-even point with examples.

Or

16. Discuss the major stand alone project risks with examples.

17. Explain major resource levelling techniques.

Or

18. Using following information related to a new project, find probability of completion of the project in at least two weeks earlier than expected.

$A < D ; A < E ; B < F ; C < G ; D < H ; E, F < I ; I < K$  (duration in weeks)

Activity :	A	B	C	D	E	F	G	H	I	K
$t_o$ :	5	17	26	16	15	6	8	7	3	7
$t_p$ :	11	22	40	20	25	6	12	9	5	9
$t_m$ :	7	20	33	18	20	6	10	8	4	8

19. Develop a project management information system for a construction project having approximate outlay Rs. 20,00,000.

Or

20. Discuss about the inputs and major outputs of Project 2010.

(5 × 12 = 60 marks)