

G 362

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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 book is permitted.
Assume any missing data if required.*

Part A

Answer all questions.

Each question carries 3 marks.

1. How will you estimate heat transfer through corners ?
2. Define Nusselt number.
3. What is the importance of effectiveness of a fin ?
4. Define black and grey surfaces.
5. Write the analogy between heat and mass transfer.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Compare one-dimensional heat transfer with and without internal heat generation.
7. How will you apply dimensional analysis for forced convection ?
8. Write and discuss all the governing equations for extended surface heat transfer.
9. With sketches, explain the concept of radiation shields.
10. Define and explain Fick's law of diffusion.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each question carries 12 marks.

11. With necessary assumptions, derive the general heat conduction equation in Cartesian co-ordinates.

Or

Turn over

12. What is critical thickness of insulation? Obtain critical thickness of insulation for different conditions of heat transfer.
13. A rectangular duct, 30 cm × 20 cm in cross-section, carries cold air. The temperature of the outer surface of the duct is 5°C and the surrounding air temperature is 25°C. Estimate the rate of heat gain by the duct, assuming that the duct, one metre in length, is exposed to the air in the vertical position. Properties of air at 15°C = $\rho = 1.22 \text{ kg/m}^3$, $\gamma = 14.6 \times 10^{-6} \text{ m}^2/\text{s}$, $k = 0.03 \text{ W/mK}$, and $Pr = 0.7$.

Or

14. Explain Newton's law of cooling. With examples, clearly differentiate between a thermal boundary layer and hydrodynamic boundary layer. Derive the expressions for each case, indicating the behaviour of the system.
15. A counter flow double-pipe heat exchanger using super heated steam is used to heat water at the rate of 10,500 kg/h. The steam enters the heat exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. If the overall heat transfer coefficient from steam to water is 814 W/m² K, calculate the heat transfer area. What would be the increase in area be if the fluid flows were parallel?

Or

16. Explain the physical significance of a heat exchanger. Discuss, in detail the classification of heat exchangers according to (i) type of energy transfer; (ii) size; and (iii) area to volume ratio.
17. Determine the heat lost by radiation per metre length of 7.5 cm oxidized steel pipe at 300°C, if (a) located in a large room with red brick walls at a temperature of 25°C, and (b) enclosed in a 25 cm × 25 cm red brick conduct at a temperature of 25°C. The emissivity of oxidized steel is 0.79 and that of red brick is 0.93.

Or

18. Two concentric spheres, 21 cm and 30 cm in diameter, with the space between them evacuated, are to be used to store liquid air (-153°C) in a room at 27°C. The surfaces of the spheres are flushed with aluminium ($\epsilon = 0.03$) and the latent heat of vaporization of liquid air is 209.35 kJ/kg. Calculate the rate of evaporation of liquid air.
19. Discuss the governing equations and boundary conditions of two dimensional heat conduction system. Give any three practical applications.

Or

20. Determine the change in entropy when 2 kg of O₂ at 60°C are mixed with 6 kg of N₂ at the same temperature. The initial pressure of each constituent is 103 KPa and is the same as that of the mixture.

G 377

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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. Differentiate between Enthalpy and Internal energy.
2. What do you mean by super saturated flow ?
3. What is the need of inter-cooling in gas turbines ?
4. Define overall loss coefficient for a collector.
5. List the features of a coal burner.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. What are boiler accessories ? Explain.
7. Derive an expression for work done in a steam turbine.
8. Discuss the losses during a combustion process. What is a stability loop ?
9. How will you quantify the useful heat gained by a fluid ?
10. Discuss the concept of draught and its types.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. What is a Rankine cycle? Draw its T-S and P-V diagrams. Modify it for wet, dry and superheated steam. Derive the expressions for the performance of the plant.

Or

12. A steam power station uses the following cycle: Steam at boiler outlet-150 bar, 550°C, Reheat at 40 bar to 550°C, condenser at 0.1 bar. Using the Mollier chart and assuming ideal processes, find the (a) quality at turbine exhaust, (b) cycle efficiency, and (c) Steam rate.
13. Explain the working of a steam nozzle. What is the significance of mass flow rate? Derive the condition of throat pressure for maximum discharge.

Or

14. Explain the velocity triangles, work generated and governing of a steam turbine. What is the role of a steam turbine in a power plant.
15. In a gas turbine plant, working on the Brayton cycle with a regenerator of 75% effectiveness, the air at the inlet to the compressor is at 0.1 MPa, 30°C, the pressure ratio is 6, and the maximum cycle temperature is 900°C. If the turbine and compressor have each an efficiency of 80%, find the percentage increase in cycle efficiency due to regeneration.

Or

16. Discuss the different types of combustion chambers in gas turbines. Discuss the concept of combustion intensity and combustion efficiency.
17. Discuss the focusing type solar collectors, solar concentrators and solar receivers. Discuss the principle and working with schematic diagrams.

Or

18. Explain the optical losses, thermal performance and power generation using solar energy-based systems.
19. A cyclic steam power plant is to be designed for a steam temperature at turbine inlet of 360°C and an exhaust pressure of 0.08 bar. After isentropic expansion of steam in the turbine, the moisture content at the turbine exhaust is not to exceed 15%. Determine the greatest allowable steam pressure at the turbine inlet, and calculate the Rankine cycle efficiency for these steam conditions. Estimate also the mean temperature of heat addition.

Or

20. Explain in detail, the layout and operation of diesel power plant.

(5 × 12 = 60 marks)

G 437

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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. Define feasibility analysis of a project.
2. How will you carry out financial evaluation of a project ?
3. Detail all the types of risks in investments.
4. Define critical path method.
5. List all the softwares used for project management.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Discuss the features of capital investments.
7. Define economic optimization of projects.
8. Explain all the sources of risk in decision making.
9. What is the significance of tools in scheduling ?
10. Why Economics contribute computer aided project management ?

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. Define 7-s of Project management. Discuss the concepts, steps and examples to clarify these elements in Project Management. (12 marks)

Or

Turn over

12. Explain the importance of analysis in a comprehensive project ? What are the steps in cost benefit analysis from a social perspective ?

(12 marks)

13. Discuss the constraints for estimation of total cost of a project. Discuss all the elements of the total costs and investments.

(12 marks)

Or

14. Compare the techniques for evaluation of projects. What are the steps in solution of problems using (a) benefit cost ratio method ; and (b) internal rate of return method ?

(12 marks)

15. With neat sketches, explain the interpretations and analysis of a break even chart. Discuss the limitations of the chart.

(12 marks)

Or

16. Discuss the methods for calculating depreciation. An old car was purchased for Rs. 32,000. Its life was estimated as 10 years and the scrap value as Rs. 18,000. Calculate the depreciation rate.

(12 marks)

17. Explain all the applications of network technique to simple engineering problems. What is the technique of resource smoothing ?

(12 marks)

Or

18. With neat sketches, explain the following :

(a) Constrained resources for project scheduling.

(b) Crashing of Projects.

(6 + 6 = 12 marks)

19. Discuss all the aspects of project 2010. Explain all the reports available in project 2010.

(12 marks)

Or

20. Discuss the application of Computer for (a) data processing, and (b) critical path analysis. What are their effects on Project Management ?

(12 marks)

[5 × 12 = 60 marks]

G 441

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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. State Hooke's law. Write down the Hooke's law relations for the normal strain in three directions.
2. Write down the strain displacements of a three dimensional elasticity problem.
3. Write down the differential equation for a two-dimensional elasticity problem with zero body force. Mention how this equation can be solved.
4. What are strain invariants ? Write down its expressions in terms of Cartesian components of strain.
5. Write down the expressions for stain in polar co-ordinates.
6. Write down the differential equation of equilibrium of a rotating disc.
7. What are photoelastic contours ? How it is helpful in identifying the regions of stress concentration.
8. Determine the components of stress for the displacement field given by $u = Axy$ $v = Bxz^2$
 $w = c(x^2 + y^2)$.
9. What is a Mohr's circle of stress ? Explain how it is constructed for a two-dimensional problem.
10. What is Chain link ?

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each question carries 12 marks.

11. Investigate what problem is solved by the stress function :

$$\phi = \frac{-F}{d^3} xy^2 (3d - 2y)$$

applied to the region included in $y = 0$, $y = d$, $x = 0$, on the positive side of x -axis.

Or

Turn over

12. A stress state is given by

$$\sigma_x = \sigma_y = \sigma_z = \tau_{xy} = \tau_{yx} = 0$$

$$\tau_{xz} = \tau_{zx} = -G\theta y, \tau_{yz} = \tau_{zy} = G\theta x,$$

where 'θ' is a constant. Check whether then stress satisfy the conditions of equilibrium. Also show that the lateral surface is free of load.

13. Write down the expressions of stress invariant. For the state of stress given below, obtain the principal stresses :

$$\sigma = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

Or

14. The displacement field in micro meter for a body is given by :

$u = (x^2 + y)i + (3 + z)j + (x^2 + 2y)k$. Determine the principal strains at (3, 1, -2) and the direction of minimum principal strain.

15. Determine the value of the constant C in the stress function $\phi = Cr^2 (\cos 2\theta - \cos 2\alpha)$ required to satisfy the conditions :

$$\sigma_\theta = 0 \quad \tau_{r\theta} = s \quad \text{on } \theta = \alpha$$

$$\sigma_\theta = 0 \quad \tau_{r\theta} = -s \quad \text{on } \theta = -\alpha$$

Or

16. Derive the equations of equilibrium in polar co-ordinates.

17. A thick-walled steel cylinder with radii $a = 5$ cm and $b = 10$ cm is subjected to an internal pressure P. The yield stress in tension for the material is 350 MPa. Using a factor of safety, determine the maximum working pressure P.

Take $E = 207 \times 10^6$ kPa, $\nu = 0.25$.

Or

18. Derive the equations of stress distribution in a thick cylindrical shell.

19. Describe with the help of an example, the method of photo elastic stress determination.

Or

20. Derive the equation for 'e' in bending of a beam of rectangular cross-section as $e = \rho_0 - \frac{h}{m \left(\frac{r_2}{r_1} \right)}$

with usual notations.

(5 × 12 = 60 marks)

G 451

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

METROLOGY AND INSTRUMENTATION (M,U)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100

Part A

Answer all questions.

Each question carries 4 marks.

1. Briefly discuss the analysis of variance of measurement data .
2. What are comparators ?
3. Define wear allowance.
4. Write a note on gauges materials.
5. What is the effect of surface finish an crack formation ?
6. Compare the roughness values produced in shaping, grinding and honing.
7. How selection of tolerance depend on quality of a product ?
8. Write a note on errors possible in a CMM.
9. What are the different types of strain gauges ?
10. What do you mean by loading effect on instruments ?

(10 × 4 = 40)

Part B

Answer all questions.

Each question carries 12 marks.

11. Explain the control chart techniques for analysis of measurement data.

Or

12. Discuss the various aspects of systems of limits and fits.
13. Explain the construction and working of angular measurement instruments.

Or

14. Discuss the softwares generally used for circularity and flatness measurements.

15. Explain the working of (i) SEM and (ii) TEM. Mention their applications.

Or

16. Discuss the various instruments for surface finish measurement.

17. Explain the features and principle of working of a non contact CMM.

Or

18. Explain the various measurements of gears and the techniques.

19. Discuss various static characteristics of a measuring instrument.

Or

20. Explain the construction and working of difference types of dynamometers.

(5 × 12 =

G 461

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

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. Write the importance of valve timing diagram.
2. Differentiate between air standard cycle and fuel-air cycle for a diesel engine.
3. Define Carburation.
4. What are M.P.F.I. systems ?
5. List the techniques to evaluate combustion quality.
6. Briefly explain the terms : flash point and fire point.
7. How will you control diesel knock ?
8. Briefly discuss the mechanism of spray generation in diesel engine.
9. Prepare a small chart indicating the pollutants formed from CI engines.
10. Distinguish between Indicated power and Brake power.

(10 × 4 = 40 marks)

Part B

Answer all questions.

Each question carries 12 marks.

11. (a) Explain the construction, working and application of a stratified charge engine.

Or

- (b) Discuss the chemical configurations, qualities and ratings of fuels used in (i) petrol engine ;
and (ii) diesel engine.

Turn over

12. (a) Explain the importance, types and applications of lubrication systems used in SI engines.

Or

(b) What is heat balance test? Briefly discuss the theory of engine heat transfer.

13. (a) Discuss the various methods and considerations for combustion chamber design.

Or

(b) With different types of plots, explain the stages of combustion in a petrol engine.

14. (a) Discuss how the motion of air and swirl influence the combustion action in a CI engine.

Or

(b) How will you select chemically correct air-fuel ratio for a diesel engine? How does this change for different modes of engine operation?

15. (a) With diagrams, discuss the methods of exhaust gas treatment in a typical spark ignition engine.

Or

(b) Discuss the significance, methodology and expected results for a morse test.

(5 × 12 = 60 marks)

G 490

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Mechanical Engineering/Automobile Engineering

COMPUTER AIDED DESIGN AND MANUFACTURING (M,U)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

All questions carry equal marks.

1. (a) Explain the output devices in CAD. (10 marks)

(b) Discuss the methods of Engineering analysis. (10 marks)

Or

2. (a) Explain the procedure for automation of drafting. (10 marks)

(b) With a block diagram, explain the working of a CIM system. (10 marks)

3. (a) Differentiate between open-loop and closed loop NC control systems. List its advantages over NC. Explain any two applications of CNC. (10 marks)

(b) Compare : Contouring, Straight cut and Point-to-point systems. (10 marks)

Or

4. (a) What is distributed numerical control ? Discuss its advantages. (10 marks)

(b) Write a note on classification of NC machine tools. Explain their driving devices too. (10 marks)

5. (a) Compare : Fixed block format, Tab sequential format and word address format. (10 marks)

(b) Give examples for geometry commands, motion commands and post-processor commands in APT. (10 marks)

Or

Turn over

6. (a) Write a part program to drill a hole and generate internal threads on it (Assume suitable dimensions). (10 marks)
- (b) With a suitable example, explain programming with interactive graphics. (10 marks)
7. (a) Explain the differences between variant and generative methods of process planning. (10 marks)
- (b) Briefly discuss the Opitz method of coding of parts. (10 marks)

Or

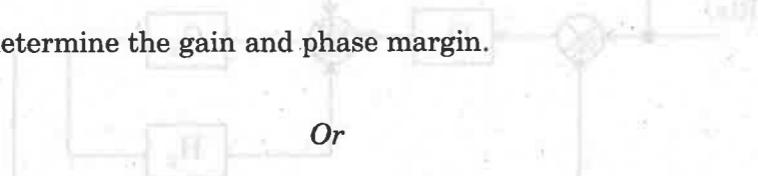
8. (a) Explain the softwares used for CAPP. Discuss their features. (10 marks)
- (b) Discuss the advantages of computer assisted process planning over manual process planning. (10 marks)
9. (a) Explain the 'degree of freedom' of an Industrial robot. What are the motions of the wrist of a robot? (10 marks)
- (b) Discuss the procedure to estimate weight carrying capacity of a robot. (10 marks)

Or

10. (a) Discuss the application of an Industrial robot to material handling. (10 marks)
- (b) Explain the method of Kinematic analysis of an Industrial robot. Discuss the softwares used for this purpose. (10 marks)

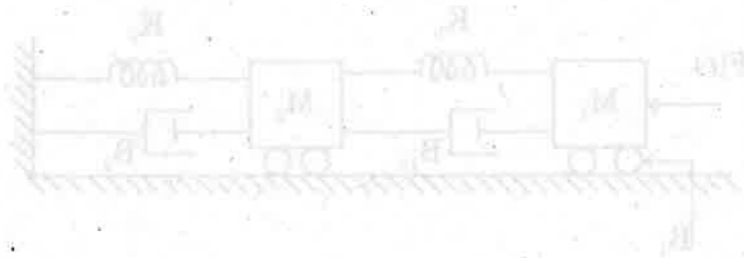
[5 × 20 = 100 marks]

19. The open loop transfer function of a unity feedback system is given by $G(s) = \frac{1}{s(1+s)^2}$. Sketch the polar plot and determine the gain and phase margin. (12 marks)



20. For the function $G(s) = \frac{5(1+2s)}{(1+4s)(1+0.25s)}$, draw the bode plot. (12 marks)

(5 × 12 = 60 marks)



B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Automobile Engineering / Mechanical Engineering

AU 010 605 AND 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. Define the term modulation.
2. What are the commonly used protocols in communication ?
3. What are the basic elements used for modelling mechanical rotational system ?
4. What is steady-state error of control system ? Explain.
5. What are the advantages of Bode plot.

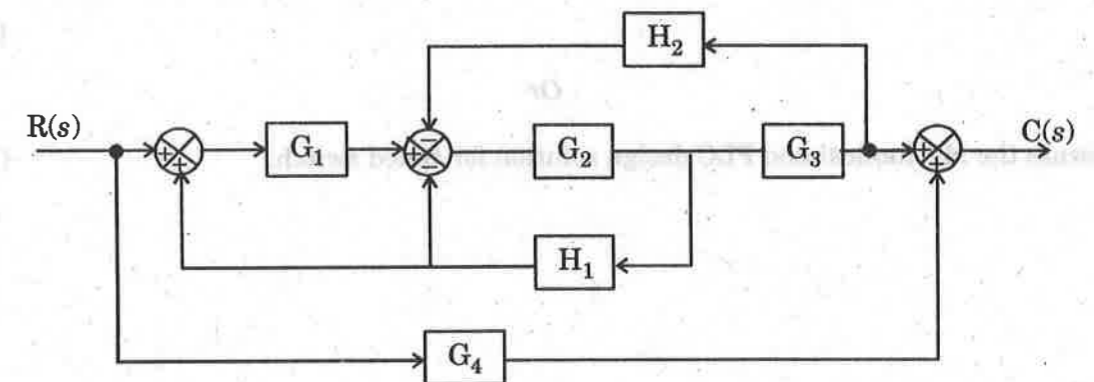
(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain any one mechanical transducer.
7. Draw the ladder program for an XOR gate and explain each step.
8. Obtain the closed loop transfer function $C(s)/R(s)$ of the system whose block diagram is given by :



Turn over

9. A unity feedback system has the forward transfer function $G(s) = \frac{k_1(2s+1)}{s(5s+1)(1+s)^2}$. The input $r(t) = 1 + 6t$ is applied to the systems. Determine the minimum value of k_1 , if the steady error is to be less than 0.1.
10. What are gain margin and phase margin? How do they enable to analyse the stability of a control system?

(5 × 5 = 25 marks)

Part C

Answer all questions.

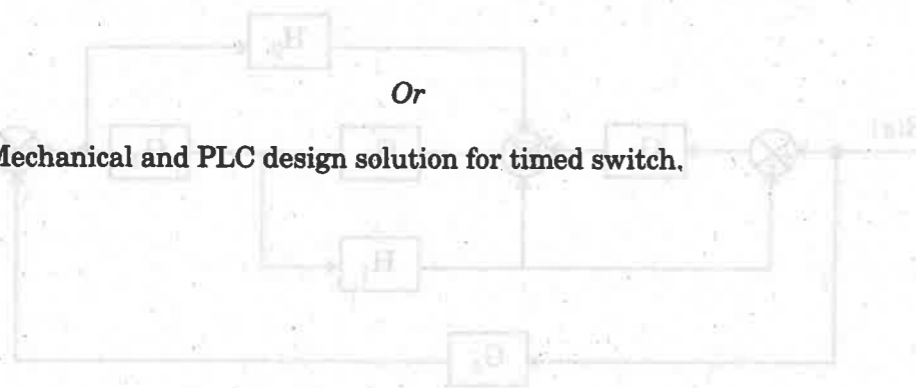
Each question carries 12 marks.

11. A parallel plate capacitive transducer uses plates of area 250 mm², which are separated by a distance of 0.2 mm. The dielectric used is air which is having a permittivity of 8.85×10^{-12} F/m. Calculate the change in capacitance, if a linear displacement reduces the distance between the plates to 0.18 mm. Also calculate the ratio of per unit change of capacitance to per unit change of displacement.

(12 marks)

Or

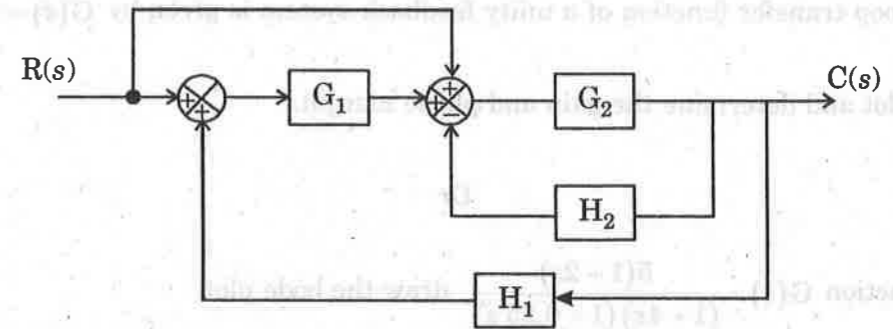
12. Discuss the major features, scope and application of Mechatronics. (12 marks)
13. With neat diagram, explain programmable logic controller. With an example, explain ladder logic used in PLC. (12 marks)



(12 marks)

14. Discuss the Mechanical and PLC design solution for timed switch. (12 marks)

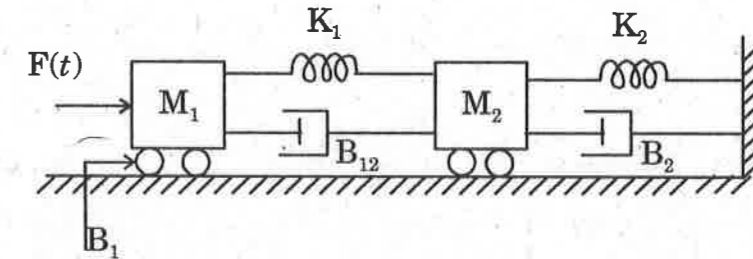
15. Using the block diagram reduction technique, find the transfer function for the system :



(12 marks)

Or

16. Explain the governing equation of the following Mechanical system :



(12 marks)

17. Derive the response of second order system for unit step input for the damping ratio ζ , under :

- (a) $0 < \zeta < 1$.
- (b) $\zeta = 1$.
- (c) $\zeta > 1$.

(12 marks)

Or

18. Using the Routh stability criteria, determine the stability of the system whose characteristic equation is given by :

$$s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0.$$

(12 marks)

Turn over

G 353

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

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 D'Alembert's Principle.
2. What are the different types of governors ?
3. Explain the function of a flywheel.
4. Explain pitching, rolling, and yawing of naval ships with neat diagrams.
5. Explain different types of brakes.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain the method of virtual work with an example.
7. What are spring controlled governors ? Describe the function of any one of them.
8. What do you mean by dynamical equivalent system ? Explain.
9. Explain the gyroscopic effect on a two wheeled vehicle.
10. What are the different types of dynamometers ? Explain.

(5 × 5 = 25 marks)

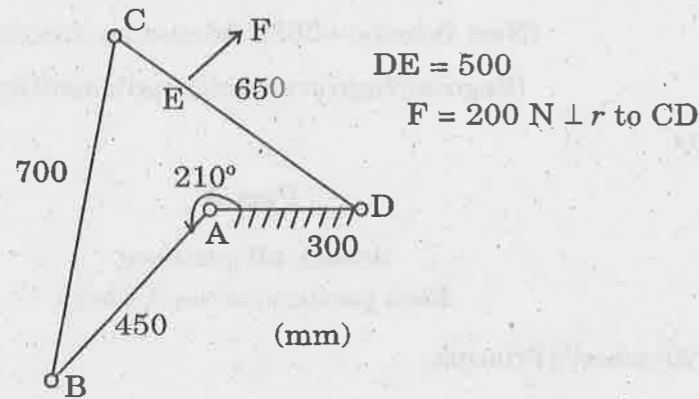
Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. Find the torque required to be applied to link AB of the linkage shown in figure to maintain static equilibrium.



Or

12. A Connecting rod is suspended from a point 25 mm above the centre of small end and 650 mm above its C.G. Its mass being 37.5 kg, and the time period of oscillation is 1.87 seconds. Obtain the dynamical equivalent system consisting of two masses one of which is located in the small end centre.
13. A Porter governor has two balls each of mass 3 kg and a central load of mass 15 kg. The arms are 200 mm long pivoted on the axis of the max. and min. radii of rotation of the balls are 160 mm and 120 mm respectively, find the range of speed.

Or

14. A Proell governor has all the four arms of length 250 mm. The upper and lower ends of the arms are pivoted on the axis of rotation of the governor. The extension arms of the lower links are each 100 mm long and parallel to the axis when the radius of the ball path is 150 mm. The mass of each ball is 4.5 kg and the mass of the central load is 36 kg. Determine the equilibrium speed of the governor.

15. An engine flywheel has a mass of 6.5 tonnes, and radius of gyration is 2 m. If the max. and min. speeds are 120 r.p.m. and 118 r.p.m. respectively, find maximum fluctuation of energy.

Or

16. A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 r.p.m. The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is $\pm 2\%$ of mean speed. The mean dia of flywheel rim is 2 m and the hub and spokes provide 5% of the rotational inertia of the flywheel. Find the mass, cross sectional area of the flywheel rim. Take density of the material as 7200 kg/m^3 .
17. A flywheel with mass 20 kg, radius of gyration 300 mm is spinning at 500 r.p.m. about a horizontal axis. The flywheel is suspended at a point 250 mm from the plane of rotation of the flywheel. Find the rate of precession of the flywheel.

Or

18. A turbine rotates at 1200 r.p.m. CW when looking from the stern. The sea vessel pitches at 1.2 rad/sec. Find out the gyroscopic couple transmitted to the hull when the bow rises? Mass of rotor = 950 kg and radius of gyration is 300 mm.
19. A torsional dynamometer is fitted on a turbine shaft to measure the angle of twist. The shaft twists 1.5° in a length of 5 meters at 500 r.p.m. The shaft is solid and has a dia of 200 mm. Find the power transmitted by the turbine. Take $G = 85 \text{ GPa}$.

Or

20. A Car moving with 36 km/hr. on a level road, has its C.G. lying 0.6 m above the ground level, wheel has 2.4 m, and the distance of C.G. from rear wheel is 0.9 m. Find the distance travelled by the car before causing to rest when brakes are applied to all the four wheels $\mu = 0.45$.

(5 \times 12 = 60 marks)

G 435

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Mechanical Engineering

ME 010 606 L 03—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. What are the functions of an automotive piston ?
2. Differentiate between wet and dry clutch.
3. How do a shock absorber work ?
4. Explain the term 'wheel balancing'. Explain the effects of an out of balance wheel.
5. Name different lights commonly used on a modern passenger car.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Describe with the help of a neat diagram, the operating principle of an electric horn.
7. Why are internal expanding drum brakes used for the wheel brakes ?
8. Explain the principle of 'Ackerman steering mechanism'.
9. List the various problems that indicate suspension system trouble.
10. List the automobile engine components and state its application.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.
Each question carries 12 marks.

11. (a) Differentiate between Two stroke and Four stroke engine.
(b) Write short notes on multipoint fuel injection systems. (6 + 6 = 12 marks)

Or

12. With the help of neat sketches, explain the working principles of various types of oil pumps used for automotive applications. (12 marks)

13. (a) Differentiate between :
(i) Single plate and Multi plate clutch.
(ii) Wet and Dry clutch. (3 + 3 = 6 marks)
(b) Discuss the various types of manual transmissions used in automobile applications. (6 marks)

Or

14. Discuss briefly a fluid coupling with the schematic diagram. (12 marks)
15. (a) Explain with the help of a neat and labelled sketch, the construction and working of a telescopic type of shock absorber.
(b) Explain briefly how hydraulic shock absorbers act to reduce car tossing and rolling? (6 + 6 = 12 marks)

Or

16. (a) What are the stages in suspension system? (6 marks)
(b) Write short notes on :
(i) Macpherson strut.
(ii) Torsion bar. (3 + 3 = 6 marks)

17. (a) Write a detailed note on 'tandem master cylinder'. (6 marks)
(b) What are the advantages of electric brakes? Describe its working details. (6 marks)

Or

18. Explain the hydraulic brake systems with a neat diagram showing all the components. (12 marks)

19. With the help of a simple circuit diagram, discuss briefly the following :
(a) Battery ignition system.
(b) Lighting and Accessory system. (6 + 6 = 12 marks)

Or

20. Write short notes on :
(a) Engine tuning.
(b) Bendix drive. (6 + 6 = 12 marks)
[5 × 12 = 60 marks]

G 382

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Automobile Engineering / 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. Explain nomenclature of drill point.
2. What are different milling cutters?
3. Write a note on gear errors.
4. What is the effect of temperature on gauge block?
5. What is an optical square?

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain : Slotting of key ways.
7. How will you estimate thermal damage due to grinding?
8. What is the principle of Gear shaping? Explain.
9. Sketch and explain a Sine bar.
10. How will you compare surface finish in different machining processes? Discuss.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. With neat sketch, explain a quick return motion mechanism.

Or

Turn over

12. Explain Counter sinking and trepanning.
 13. Explain the operations to be performed in a machining center.

Or

14. Discuss the methods for truing and dressing of grinding wheels.
 15. Explain different types of gear hobbing machines.

Or

16. Discuss the principle and working of all gear milling machines.
 17. Discuss, with neat sketches :

- (a) Precision level ; and
 (b) Clinometer.

Time : Three Hours

Part A

Answer all questions.

Each question carries 3 marks.

(6 + 6 = 12 marks)

Or

18. Discuss all the principles of achieving accuracy. Explain all types of errors.
 19. How will you measure squareness? Explain.

Or

20. Explain the principle, working and applications of a Talyrand.

[5 × 12 = 60 marks]

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Explain : Slotting of key ways.
 7. How will you estimate thermal damage due to grinding?
 8. What is the principle of Gear shaping? Explain.
 9. Sketch and explain a Sine bar.
 10. How will you compare surface-finish in different machining processes? Discuss.

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. With neat sketch, explain a quick return motion mechanism.

Or

Turn over