

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch : Mechanical Engineering

DYNAMICS OF MACHINERY (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. A circular disc mounted on a shaft carries three attached masses 4 kg, 3 kg and 2.5 kg at a radial distances 75 mm, 85 mm and 50 mm. at the angular positions of 45° , 135° and 240° respectively. The angular positions are measured counter-clockwise from the reference line along x -axis. Determine the amount of the counter mass at a radial distance of 75 mm. required for static balance.
2. Explain direct and reverse crank method of balancing radial engines.
3. Define simple harmonic motion. Express the displacement, velocity and acceleration in the form of vectors and sketch the same.
4. Obtain the natural frequency of a spring mass system using Rayleigh method.
5. Discuss the behaviour of underdamped, over damped and critically damped systems using a graph of amplitude *vs* time.
6. Explain the working of a vibrometer with a neat sketch.
7. Obtain the influence coefficients of a double pendulum with equal lengths of rod and equal masses.
8. Discuss the phase relationships of a shaft with a central disc subjected to critical speeds without damping.
9. Explain Duffing's equation as applied to nonlinear vibrations.
10. Write a note on building acoustics.

(10 × 4 = 40 marks)

Turn over

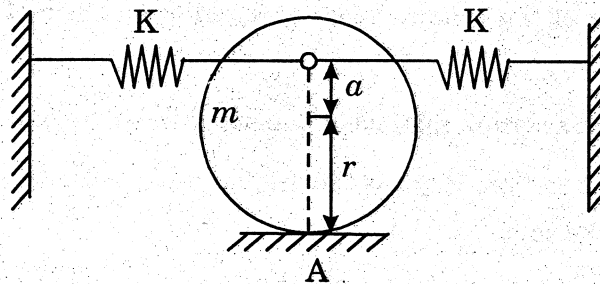
Part B

Answer all questions.
Each question carries 12 marks.

11. A system of rotating masses which is in complete dynamic balance has magnitudes of 5, 6 M and 8 kg. and revolve in planes A, B, C and D. The planes B, C and D are at distances of 0.3 m, 1.2 m and 2.0 m. respectively from A. All the masses are at the same radii of 0.3 m. Find the magnitudes of M and relative angular position of all the masses for complete balance.

Or

12. The pistons of a 4-cylinder vertical in line engine reach their uppermost position at 90° interval in order of their axial position. Pitch of the cylinder = 0.35 m. Crank radius = 0.12 m. Length of Connecting rod = 0.42 m. The engine runs at 600 r.p.m. If the reciprocating parts of each cylinder is 2.5 kg, find the unbalanced primary and secondary forces and couples. Take the central plane of the engine as reference plane.
13. Determine the natural frequency of the system shown in fig. using (i) Newton's method (ii) energy method

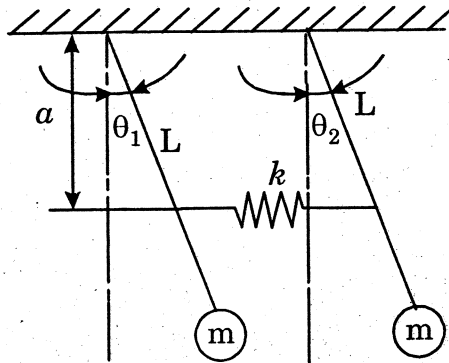


Or

14. The disc of a torsional pendulum has a moment of inertia of 0.06 kg-m^2 and is immersed in a viscous fluid. The brass shaft ($G = 44 \text{ GPa}$) attached to it is of 100 mm. diameter and 400 mm. long. When the pendulum is vibrating, the amplitudes on the same side for successive cycles are 9° , 6° and 4° . Determine ; (1) Logarithmic decrement ; (ii) Damping torque at unit velocity ; and (iii) Periodic time of vibration.

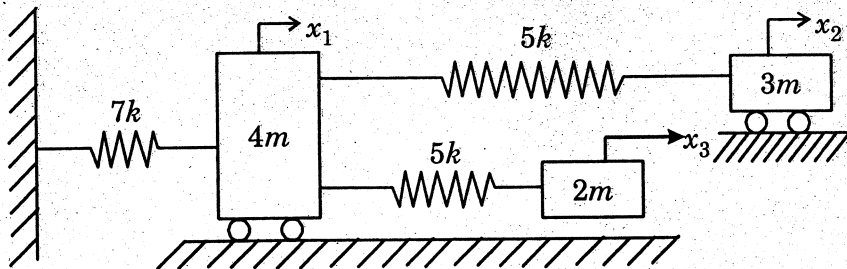
What would be the frequency if the disc is removed from the viscous fluid ?

15. Two simple pendulums are connected by a spring as shown in fig. Determine the natural frequencies of the pendulum.



Or

16. Use Stodola method to determine the lowest natural frequency of the branched system shown in fig.



17. A disc of mass 4 kg. is mounted midway between bearings which may be assumed to be simple supports. The bearing span is 480 mm. The steel shaft which is horizontal is 9 mm. in diameter and rotates at 760 r.p.m. The center of gravity is displaced 3 mm. from the geometric center. Taking damping coefficient as 49 N-sec./m. and E as 200 Gpa, determine the dynamic load on the bearings.

Or

18. Discuss the differences between linear and nonlinear vibrations. Give examples of nonlinear vibrations.

Turn over

19. Explain the phenomenon of sound propagation. What are the acceptable noise levels ?

Or

20. What are acoustical measurements ? Explain recording and reproduction of sound.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch : Mechanical Engineering

WELDING TECHNOLOGY (Elective I) [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. Briefly explain the advantages and limitations of Welding.
2. Differentiate Soldering and Brazing.
3. What are the types of flames and briefly explain any *one* type ?
4. Explain leftward welding technique.
5. Briefly explain the classification of electrodes.
6. Explain straight and reverse polarities.
7. Brief Plasma arc welding.
8. What are the applications of Laser beam welding ?
9. What are the various types of destructive and Non-destructive tests of welding ?
10. Explain Radiographic testing.

(10 × 4 = 40 marks)

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

11. (a) (i) Explain principle of soldering. (6 marks)
- (ii) What are the advantages and limitations of soldering ? (6 marks)
- Or*
- (b) (i) Explain aluminium brazing. (6 marks)
- (ii) Explain Forge welding. (6 marks)
12. (a) (i) Explain the different types of flames with a neat sketch. (8 marks)
- (ii) Explain the weldability of castiron. (4 marks)

*Or***Turn over**

- (b) Explain Oxy-acetylene welding equipment with a sketch. (12 marks)
13. (a) (i) Explain welding symbols with a neat sketch. (6 marks)
- (ii) Explain TIG welding. (6 marks)

Or

- (b) (i) Explain welding positions with sketches. (6 marks)
- (ii) Explain Carbon arc welding with a neat sketch. (6 marks)
14. (a) Explain Ultrasonic welding with a neat sketch. (12 marks)

Or

- (b) (i) Write a note on friction welding. (6 marks)
- (ii) Write a note on cold welding processes. (6 marks)
15. (a) (i) Explain the causes of development of welding residual stresses. (6 marks)
- (ii) Explain the commonly found defects in welded joints. (6 marks)

Or

- (b) (i) Explain Magnetic particle test. (6 marks)
- (ii) Explain Eddy-current test. (6 marks)

[5 × 12 = 60 marks]

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch : Automobile Engineering

AU 010 701/ME 010 701—DESIGN OF MACHINE ELEMENTS (AU, ME)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

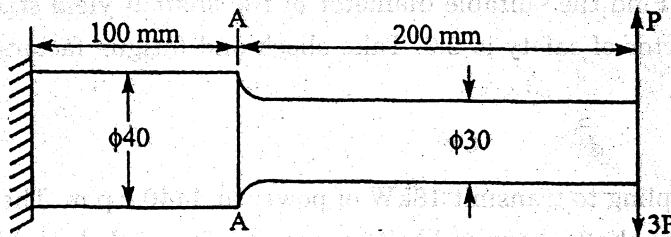
Maximum : 100 Marks

*Use of approved design data book is permitted.**Any missed data may suitably be assumed.**Answer all questions.**Each question carries 25 marks.*

1. Explain in detail the design considerations in design of machine elements.

Or

2. A cantilever beam shown in fig. below is subjected to load varying from P to $3P$. Determine the value of ' P ' if the material of beam has ultimate strength of 620.8 MPa, yield strength of 400 MPa and endurance strength of 345.2 MPa. The stress concentration factor may be taken as 1.4. Analyze the member at the change of cross section A-A. Use factor of safety = 3.



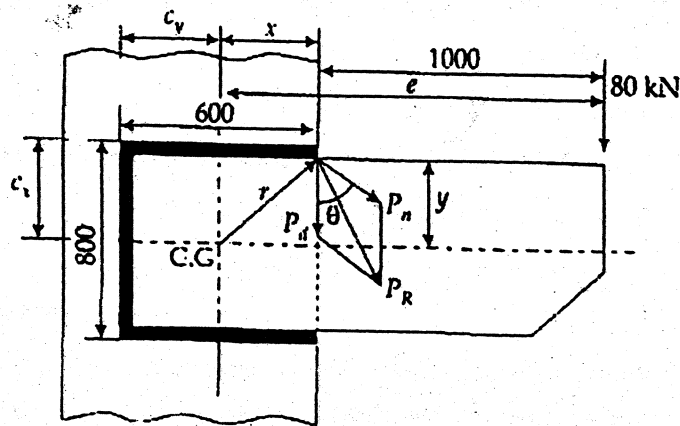
3. Design a triple riveted double cover butt joint with unequal cover plates to connect two plates of 20 mm thickness. Use permissible values of tensile, compressive and shear stresses as 90 N/mm², 150 N/mm² and 60 N/mm² respectively.

Or

4. The square thread of a screw jack has a specification of 80 × 16 and is to raise a load of 100kN. The mean radius of the thrust collar is 65mm. The coefficient of friction for the threads and collar are 0.1 and 0.12 respectively. Determine: (i) the torque required to raise the load ; (ii) the overall efficiency ; (iii) Does the screw overhaul underload. Comment.

Turn over

5. Determine the size of the weld for a bracket welded as shown in fig. below. Allowable shear stress in the weld is 90 MPa.



Or

6. The load on a steel helical compression spring varies from 500 N to 1200 N. The spring index is 6 and the desired factor of safety is 1.3. Determine the required wire size by taking yield shear stress as 600 MN/m² and the endurance shear stress as 300 MN/m².
7. A mild steel shaft transmits 15kW of power at 300 rpm. It is supported on two bearings 1.2 m apart. The shaft receives power through a 450 mm diameter pulley mounted at 300 mm to the right of the right bearing. The power is given out through a 300 mm diameter gear mounted at 250 mm to the right of the left bearing. The belt drive is horizontal and the gear drives with a downward tangential force. Find the suitable diameter of the shaft if yield stress for the shaft material is 234 MPa and factor of safety is 2.0. Take shock and fatigue factors as 1.5. Ratio of tensions in belt is 3.0.

Or

8. Design a rigid CI flange coupling to transmit 18kW of power at 1440 r.p.m. The allowable shear stress for flange is 4 MPa. The shafts, keys and bolts are made of annealed steel having allowable shear stress of 93 MPa. Allowable crushing stress for key = 186 MPa.

(4 × 25 = 100 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch : Mechanical Engineering

ME 010 702—DYNAMICS OF MACHINES (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. How will you evaluate the performance of a balancing machine ?
2. Define transmissibility ratio.
3. Discuss the role of influence coefficients in vibrations.
4. Define acoustic impedance.
5. Write a note on Doppler effect.

(5 × 3 = 15 marks)

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

- 6 Explain Static balancing and Dynamic Balancing.
- 7 Write expressions for critically damped system and explain the applications.
- 8 Explain the working of Dry friction damper with a neat diagram ?
- 9 How will you control non-linear forces in forced vibrations ? Discuss the dynamic behaviour of the system.
- 10 Explain the process of recording and reproduction of sound.

(5 × 5 = 25 marks)

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

11. Four masses A, B, C and D are completely balanced. Masses C and D make angles 90 and 210 degree respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360, 480, 240 and 300 mm respectively the masses B, C and D are 15kg, 25kg and 20kg respectively.

Turn over

Determine :

- (a) The mass A and its angular position.
- (b) Positions of planes A and B.

Or

- 12. Discuss in detail Dalby's method of balancing of several masses rotating in several planes.
- 13. Discuss all the conditions for transmissibility of vibration. How will you model transmissibility? Why is vibration isolation important?

Or

- 14. Explain Over damped system and Under damped system.
- 15. Explain the following two techniques with help of neat diagrams.
 - (a) Dunkerly's method. (6 marks)
 - (b) Stodola approach. (6 marks)

Or

- 16. The moment of inertia of 3 rotors A, B and C are respectively 0.3, 0.6 and 0.8 kg-m², the distance between A and B is 1.5 m and B and C is 1 m, the shaft is 70 mm in diameter and modulus of rigidity for the shaft material is 84×10^9 N/m². Find
 - (a) Frequencies of torsional vibrations. (4 marks)
 - (b) Position of nodes. (4 marks)
 - (c) Amplitude of vibrations. (4 marks)
- 17. Using Laplace Transform determine the response of an undamped single d. o. f system of natural frequency ω_n and mass M when it is subjected to a constant force of magnitude F_0 . The system is at rest at time $t = 0$.

Or

- 18. Discuss the response of a transient vibration system, when the input signal is :
 - (a) Step wave form. (6 marks)
 - (b) Impulsive. Derive the equations of motion. (6 marks)
- 19. (a) Explain the working of a sound level meter with a neat sketch. (7 marks)
- (b) Write short note on acoustical measurements. (5 marks)

Or

- 20. Explain the importance of practical noise control. Discuss the strategies, measurements and techniques of industrial noise control. List all the challenges involved.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch : Mechanical Engineering/Automobile Engineering

AU 010 705/ME 010 705—INDUSTRIAL ENGINEERING (ME, AU)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

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

1. Differentiate between Production and Productivity.
2. Discuss the merits and demerits of product layout and process layout.
3. Define Vendor evaluation.
4. Distinguish between Method study and Time study.
5. Differentiate b/w control chart for attributes and control charts for variables.

(5 × 3 = 15 marks)

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

6. Write and explain the various types of productivity.
7. What are the characteristics of just in time ?
8. List and explain different types of costs in inventory system.
9. Briefly discuss the steps in method study.
10. Write notes on sequential sampling plan.

(5 × 5 = 25 marks)

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

11. Define industrial engineering and discuss its functions ?

Or

12. Briefly explain the steps in product design.

Turn over

13. List and explain the classification of material handling equipments.

Or

14. What is the importance of plant location ? Discuss in detail the factors which should be considered in selecting a site for an industrial plant.

15. List and explain the purchase system.

Or

16. What are the types of model of inventory system ? Explain them in detail.

17. What is work measurement ? What are the different techniques available for this ?

Or

18. State and explain various methods of Job Evaluation.

19. What is TQM ? Explain the basic tools of TQM.

Or

20. Write the objectives of inspection. Explain the various methods of inspection.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015**Seventh Semester**

Branch—Mechanical Engineering

ME 010 706 L04—SALES AND MARKETING MANAGEMENT (Elective II) (ME)

(New Scheme—2010 Admission Onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. What is marketing ?
2. Defining planning.
3. Define product development.
4. What is buying behavior.
5. Define sales territory.

(5 × 3 = 15 marks)

Part B

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

6. Explain sales promotion in detail.
7. Discuss SUB in detail.
8. In what ways relationship will make an impartment role in marketing.
9. Discuss the factors affecting with consumer behavior.
10. Write the functionality of sales management.

(5 × 5 = 25 marks)

Part C

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

11. Explain advertising of product and sales promotion in marketing.

Or

12. Discuss market demand with respect to product value and satisfaction to customer.

Turn over

13. Discuss SWOT analysis in detail.

Or

14. In what ways the strategic planning will help in marketing support system.

15. Explain product lifecycle with different stages.

Or

16. In what ways the product development will help in the generation of new idea.

17. Explain buying center with purchasing process in detail.

Or

18. What are the major factors affecting consumer buying behavior ?

19. Discuss the objectives of sales management.

Or

20. Write a short note on :

(i) personal selling situations ;

(ii) recruitment and selection process.

(5 × 12 = 60 marks)

B.TECH. DEGREE EXAMINATION, MAY 2015**Seventh Semester**

Branch : Mechanical Engineering

M.705—MACHINE DESIGN AND DRAWING—I

(Old Scheme—Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours

Maximum : 100 Marks

*Answer any four questions by selecting two from Part A and two from Part B.**Each question carries 25 marks.**Missing data, if any, may be assumed suitably.***Part A**

1. A stepped shaft is stepped down from 80 mm. diameter to 40 mm. diameter with a fillet radius of 6 mm. Determine the maximum stress induced in the shaft by taking stress concentration factor into account, if the shaft is subjected to :
 - (a) Bending moment of 200 N-mtr ; and
 - (b) Twisting moment of 400 N-mtr.
2. Design a socket and spigot type cotter joint to connect two rods subjected to a steady axial pull of 100 kN. The material used for spigot end, socket end and the cotter is C40 (40C8) steel having tensile yield strength of 328.6 MPa. Take factor of safety as 4 for tension, 6 for shear and 3 for crushing based on the tensile yield strength.
3. Design a flange coupling to connect the shafts of a motor and centrifugal pump for the following specifications :

Pump put = 3000 L/min.,
Total head = 20 m.
Pump speed = 600 rpm and
Pump efficiency = 70 %

Select C40 steel ($\sigma_y = 328.6$ MPa) for shaft and C35 steel ($\sigma_y = 304$ MPa) or both, with factor of safety 2, use allowable shear stress in cast iron flange equal to 15 MPa.
4. Two lengths of a flat tie bar of 15 mm. thick are connected by a butt joint with equal cover plates on either side. If a load of 500 kN is acting on the bar, design the joint such that the section of the bar is not reduced by more than one rivot hole. The working stresses for the material of the bar is 120 MPa in tension, and for the material of the rivet are 70 MPa in shear and 140 MPa in crushing.

(2 × 25 = 50 marks)

Turn over

Part B

5. Define Spring. List out its functions. Also sketch and explain the following springs :
- (a) Helical spring.
 - (b) Conical spring.
 - (c) Leaf spring.
 - (d) Spiral spring.
 - (e) Disc spring.
6. Discuss the detailed design procedure of various elements in the piston.
7. A section of steel shaft of 2 mtr. long supported between bearings carries a pulley of diameter 600 mm. weighing 1 kN at its mid point. The pulley delivers power to a machine causing a tension of 6 kN in the tight side of the belt and 3 kN in the slack side. The belt drive is horizontal. Assuming the loads are steady, determine the diameter of the shaft, if the allowable shear stress in the shaft material is 40 MPa.
8. A 150 mm. \times 100 mm. \times 10 mm. angle is to be welded to a steel plate by fillet welds along the edges of 150 mm. leg. The angle carries a load of 20 kN. Determine the weld length required if the permissible shear stress in the weld material is 75 MPa. The line of action of the load coincide with the gravity axis of the section.

(2 \times 25 = 50 marks)