

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****Seventh Semester**

Branch : Mechanical Engineering

DYNAMICS OF MACHINERY (M)

(Old Scheme—Prior to 2010 Admissions)

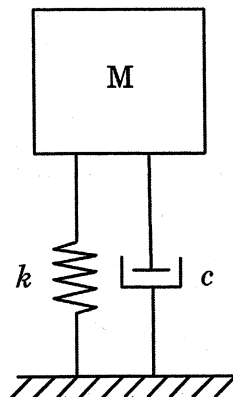
[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

**Part A***Answer all questions.**Each question carries 4 marks*

1. Derive the expression for balancing several masses rotating in same plane ?
2. What is Hammer blow and swaying couple ?
3. What is meant by vibration ? Classify it
4. Describe Rayleigh Method.
5. Define over damped, critically damped and under damped systems ?
6. Find the natural frequency of spring and mass system (vertically suspended) by energy method ?
7. What do you understand by torsionally equivalent shaft ?
8. Derive the equation of motion of the mass for free vibration as shown in fig ?

**Turn over**

9. Briefly explain Doppler Effect ? Where it is used ?
10. What is mean by noise and how it varies with frequency ?

(10 × 4 = 40 marks)

**Part B**

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

11. Four masses A, B, C and D are completely balanced. Masses C and D makes an angle of  $90^\circ$  and  $210^\circ$  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 15 kg, 25 kg and 20 kg respectively. Determine the
  - (a) Mass A and its angular position.
  - (b) Positions of planes A and D.

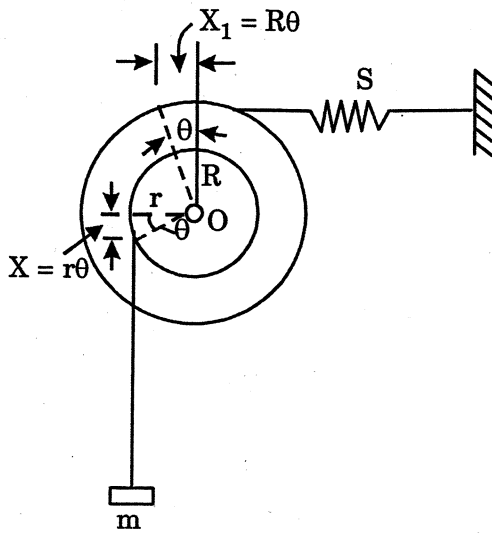
*Or*

12. The connecting rod of a three cylinder air compressor are coupled to a single crank and the axes are at 120° to one another. Each connecting rod is 180 mm. long and the stroke is 120 mm. The reciprocating parts have a mass of 1.8 kg per cylinder. Find the magnitude of the primary and secondary forces when the engine runs at 1200 r.p.m.
13. In a spring and mass vibrating system, the natural frequency of vibration is 3.56 Hz. When the amount of the suspended mass is increased by 5 kg, the natural frequency is lowered to 2.9 Hz. Determine the original mass and the spring constant?

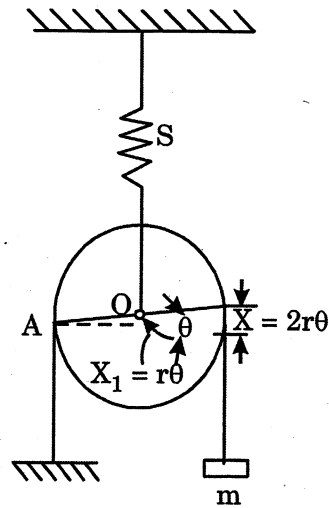
*Or*

14. A machine mounted on springs and fitted with a dashpot has a mass of 60 kg. There are three springs, each of stiffness 12 N/mm. The amplitude of vibration reduces from 45 to 8 mm in *two* complete oscillations. Assuming that the damping forces varies as the velocity, determine
  - (i) Damping coefficient.
  - (ii) Ratio of frequencies of damped and un damped vibrations.
  - (iii) Periodic time of damped vibrations.

15. Find the equation of motion and the natural frequency of the system shown in Fig. a and Fig. b.



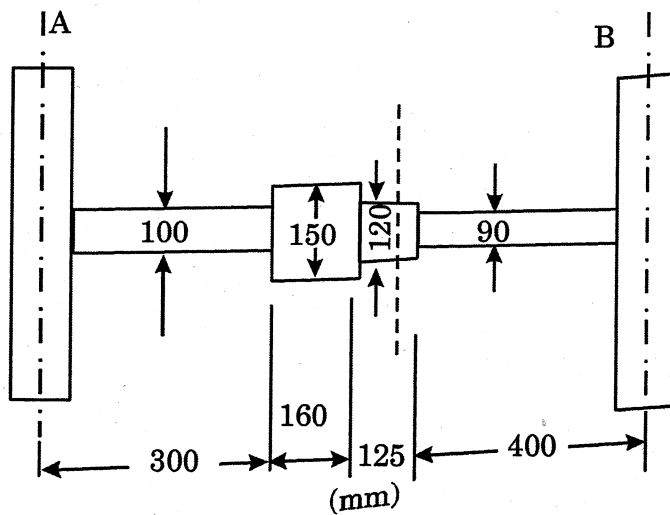
(a)



(b)

Or

16. In a single degree damped vibration system, the suspended mass 4 kg makes 24 oscillations in 20 seconds. The amplitude decreases to 0.3 of the initial value after 4 oscillations. Find the stiffness of the spring, the logarithmic decrement the damping factor and damping coefficient.
17. The shaft shown in figure Carries two masses. The mass A is 300 kg with radius of gyration of 0.75 m. and the mass B is 500 kg with radius of gyration of 0.9 m. Determine the frequency of the torsional vibration. It is desired to have the node at the mid - section of the shaft of 120 mm. diameter by changing the diameter of the section having a 90 mm. diameter. What will be the diameter?



Or

Turn over

18. A centrifugal pump rotating at 400 r.p.m. is driven by an electric motor at 1200 r.p.m. through a single stage reduction gearing. The moments of inertia of the pump impeller and the motor are  $1500 \text{ kg.m}^2$  and  $450 \text{ kg.m}^2$  respectively. The lengths of the pump shaft and motor shaft are 500 and 200 mm, and their diameters are 100 and 50 mm. respectively. Neglecting the inertia of the gears, find the frequency of torsional oscillations of the system. Take  $G = 85 \text{ GN/m}^2$ .
19. Explain the working of Microphones and loud speakers ?

*Or*

20. In the same area of a ware house, there are four large machines. Machine 1 produces a sound power of 1 W. Machine 2, 3 and 4 produces an acoustical power of 0.5 W, 0.75 W and 1.25 W respectively. What is the total power level generated in the area by the four machines ?

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****Seventh Semester**

Branch : Mechanical Engineering/Automobile Engineering

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

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

*(Use of Machine design data hand book is permitted.)**Answer all questions.**Each question carries 25 marks.*

1. Explain the ergonomic considerations in machine design. (25 marks)

*Or*

2. Explain Fits and tolerances. (25 marks)

3. What are the forms of threads used in Power Screws, Explain with neat sketch. (25 marks)

*Or*

4. A gear box weighing 7.5 kN is provided with a steel eye bolt for lifting and transporting on the shop floor. The eye bolt is made of plain carbon steel 30C8 ( $S_{yt} = 400\text{N/mm}^2$ ) and the factor of safety is 5. Determine the nominal diameter of the eye bolt having coarse threads if  $d_c = 0.8d$ , where d.c. and  $d$  are core and major diameters respectively.

(25 marks)

5. What are riveted joints ? What are its advantages and disadvantages of riveted joints over welded joints ? Explain. Also explain the type of rivet heads.

(25 marks)

*Or*

6. A helical compression spring of a cam-mechanism is subjected to an initial pre load of 50 N. The maximum operating force during the load cycle is 150 N. The wire diameter is 3 mm while the mean coil diameter is 18 mm. The spring is made of oil hardened and tempered valve spring wire of grade – VW ( $S_{ut} = 1430\text{N/mm}^2$ ). Determine the factor of safety used in the design on the basis of fluctuating stresses.

(25 marks)

**Turn over**

7. A hollow transmission shaft having inside diameter 0.6 times the outside diameter is made of plain carbon steel 40C8 ( $S_{yt} = 380\text{N/mm}^2$ ) and the factor of safety is 3. A belt pulley 1000 mm in diameter is mounted on the shaft which overhangs the left hand bearing by 250 mm. The belts are vertical and transmits power to the machine shaft below the pulley. The tension on the tight and slack side of the belts are 3 kN and 1 kN respectively, while the weight of the pulley is 500 N. The angle of wrap of belt on the pulley is 180 degree. Calculate the outside and inside diameter of the shaft.

(25 marks)

Or

8. Briefly explain keys, types of keys, advantages and their application.

(25 marks)

[4 × 25 = 100 marks]

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****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. State the conditions for dynamic balancing.
2. Discuss a method to find out the equivalent stiffness.
3. Define the terms coefficient of damping and critical damping coefficient.
4. Write a note on Laplace transformation.
5. Discuss tolerance levels of human ear in industrial context.

(5 × 3 = 15 marks)

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

6. Differentiate between Balancing of rotating masses and Reciprocating masses.
7. Find an expression for logarithmic decrement in terms of damping factor.
8. Explain the working of Centrifugal pendulum damper with a neat sketch.
9. Write a note on hard spring and soft spring ?
10. Discuss the key parameters of acoustic measurements ? Discuss an acoustic impedance filter.

(5 × 5 = 25 marks)

**Turn over**

## Part C

Answer all questions.

Each full question carries 12 marks.

11. Discuss in detail Dalby's method of balancing of several masses rotating in several planes.

Or

12. A disturbing mass of 600 kg is attached to a shaft. The shaft is rotating at a uniform velocity of  $\omega$  rad/sec. The distance of centre of gravity of the disturbing mass from the axis of rotation is 270 mm. The disturbing mass is to be balanced by two masses in two different planes. The distances of the centre of gravity of the balancing masses from the axis of rotation is 450 mm. each. The distances between the two planes of the balancing masses is 1.5 m and the distance between the plane of the disturbing mass and one of the planes of the balancing masses is 300 mm. Determine :

- (i) The distance between plane of disturbing mass and the planes of the balancing masses.
- (ii) The magnitude of balancing masses when.
  - (a) The planes of balancing masses are on the same side of the plane of disturbing mass. (6 marks)
  - (b) The planes of balancing masses are on either side of the plane of disturbing mass. (6 marks)

13. A coil of spring stiffness 4 N/mm. supports vertically a mass of 20 kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of previous vibration. Determine the damping force per unit velocity. Also, find the ratio of frequency of damped and undamped vibrations.

Or

14. Explain Critically damped system and Under damped system.
15. The moment of inertia of 3 rotors A, B and C are respectively 0.3, 0.6 and 0.8 kg-m<sup>2</sup>, 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  $84 \times 10^9$  N/m<sup>2</sup>. Find :
- (a) Frequencies of torsional vibrations. (4 marks)
  - (b) Position of nodes. (4 marks)
  - (c) Amplitude of vibrations. (4 marks)

Or



16. Derive expressions for dynamic behavior of :

(i) Distributed mass system.

(ii) Lumped mass system when the DOF of the system is more than two.

17. A Structure supporting rotating machinery vibrates excessively at an excitation frequency of 18 Hz. It is proposed to attach a vibration absorber tuned to this frequency. What should be absorber mass and stiffness so that the resulting 2 natural frequencies are at least 20% away from the excitation frequency ? The effective mass of the structure is 1 tonne and the natural frequency is 16 Hz.

*Or*

18. Discuss the response of a transient vibration system, when the input signal is :

(a) Step wave form.

(b) Impulsive. Derive the equations of motion.

19. Discuss the methods, equipments and criteria for recording and reproduction of sound. Explain the entire process with a flow chart.

*Or*

20. In the same area of a ware house there are four large machines. M/C 1 produces a sound power of 1 W. M/Cs 2, 3 and 4 produce an acoustical power of 0.5, 0.75 and 1.25W respectively. What is the total power level generated in the area by the four machines ?

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****Seventh Semester**

Branch : Mechanical Engineering

ME 10 703—GAS DYNAMICS AND JET PROPULSION (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. Briefly explain continuum concept.
2. What you understand by stagnation properties and its importance ?
3. What is meant by choking ?
4. Define "shock".
5. List components of a gas turbine engine.

(5 × 3 = 15 marks)

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

6. Derive an equation for velocity of sound.
7. Show that :

$$\frac{A}{A^*} = \frac{1}{M} \left[ \frac{2}{r+1} + \frac{r-1}{r+1} M^2 \right]^{\frac{r+1}{2(r-1)}}$$

8. Define Fanno curves or Fanno-lines.
9. Briefly explain normal shock on Fanno and Rayleigh curve.
10. Explain the working of a Ramjet engine.

(5 × 5 = 25 marks)

Turn over

**Part C**

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

11. Derive Momentum equation.

*Or*

12. Explain :

- (a) Classify flow based on Mach number and Mach cone.
- (b) Discuss the effect of Mach number on compressibility.

13. The pressure, temperature and Mach number of air at entry to a flow passages are 0.25 MPa, 27°C and 1.4 respectively. If the exit Mach number is 2.0, determine the stagnation and static temperature of the air and flow rate per unit area at inlet and exit. Assume isentropic flow.

*Or*

14. Derive an expression for mass flux in terms of pressure ratio and flow factor for an isentropic flow.

15. Air enters at a circular duct of 15 cm diameter with a Mach number of 0.5, pressure 300 kN/m<sup>2</sup> and temperature 320 K. Average friction factor for duct is 0.005. Assuming choked adiabatic flow with friction, determine :

- (a) Length of duct.
- (b) Change in entropy.
- (c) Change in impulse function.
- (d) Loss in isentropic stagnation pressure.

*Or*

16. The Mach number at the exit of a combustion chamber is 0.8. The ratio of stagnation temperatures at exit and entry is 4.01. If the pressure and temperature of gas at exit are 3 bar and 1100° C respectively. Determine :

- (a) Mach number, pressure and temperature of the gas at entry ;
- (b) The heat supplied per kg of gas ; and
- (c) The maximum heat that can be supplied.

17. The ratio of the exit to entry area in a subsonic diffuser is 5.0. The Mach number of jet of air approaching the diffuser at  $p_o = 1.013$  bar.  $T = 290$  K is 2.5. There is a standing normal shock wave just outside the diffuser entry. The flow in the diffuser is isentropic. Determine at the exit of the diffuser :

- (a) Mach number ;
- (b) Temperature ; and
- (c) Pressure.

*Or*

18. Derive an expression for Entropy change across a shock.

19. Explain working of a turbofan and pulsejet engine with neat figure.

*Or*

20. Explain :

- (a) Liquid and solid propellant rockets.
- (b) Application of rockets.

(6 marks)

(6 marks)

[5 × 12 = 60 marks]

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****Seventh Semester**

Branch : Automobile Engineering/Mechanical Engineering

AU 010 704/ME 010 704—REFRIGERATION AND AIR CONDITIONING (AU, ME)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours

Maximum : 100 Marks

*(Use of approved R and AC tables, charts and steam tables are permitted).***Part A***Answer all questions.**Each question carries 3 marks.*

1. What is the difference between a refrigerator and a heat pump ?
2. Explain the effect of sub cooling of condensate in a VCR system.
3. List the major field of application for lithium bromide water absorption system.
4. On what factors does the volumetric efficiency of a compressor depend ?
5. When is dehumidification of air necessary and how it is done ?

(5 × 3 = 15 marks)

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

6. Derive the expression for the performance factor for a refrigerator if it is running on the reversed Carnot cycle..
7. Explain a two stage compression system with a flash inter-cooler.
8. What are the functions of each fluid in a three fluid vapour absorption system ?
9. Differentiate between low side float valve and high side float valve.
10. Sketch "comfort chart" and show on it the "comfort zone".

(5 × 5 = 25 marks)

**Turn over**

## Part C

Answer all questions.  
Each question carries 12 marks.

11. Give a brief description about the air refrigeration system working on reversed Brayton cycle and derive an expression for COP.

Or

12. A dense air machine operates on a reversed brayton cycle and is required for a capacity of 10 TR. The cooler pressure is 4.2 bar and the refrigerator pressure is 1.4 bar. The air is cooled in the cooler at temperature of  $50^{\circ}\text{C}$  and the temperature of air at inlet to compressor is  $-20^{\circ}\text{C}$ . Determine for the following for the ideal cycle.

- (a) COP ; (b) Theoretical piston displacement of compressor ; (c) Mass of air circulated per min ;  
(d) Theoretical piston displacement of expander ; (e) Net power per ton of refrigeration.  
Show the cycle on  $p - v$  and  $T - s$  planes.

13. With the help of schematic and  $p - h$  diagrams, explain the working of a three stage compression system with multiple expansion valves and flash intercooler.

Or

14. A three stage compression ammonia refrigeration system with flash inter cooling operates between overall pressure limits of 2 bar and 12 bar. The flash inter cooler pressures are 4 bar and 8 bar. If the load on the evaporator is 10 TR, find the power required to run the system and compare the COP of the system with that of simple saturation cycle working between the same overall pressure limits.
15. Explain a practical vapour absorption refrigeration cycle with suitable sketches. Indicate the name of the components and the phases of various fluids. Also indicate the direction of external energy to or from the equipments.

Or

16. A vapor compression system with ammonia as the refrigerant works between the pressure limits of 2 bar and 12 bar with three stage compression. The vapours leaving the water intercoolers at pressures 4 bar and 8 bar are in a saturated state. If the load is 10 TR, find the power required to drive the three compressors and compare the C.O.P of this system with that of a simple saturation cycle working between the same overall pressure limits.
17. Why the centrifugal compressors are preferred over reciprocating in refrigeration system? Give a brief description of a centrifugal compressor with suitable sketch.

Or

18. Explain the methods used for defrosting an evaporator. With the help of a diagram explain reverse cycle defrosting method.

19. What are the equipments used in an air conditioning system ? With a neat diagram explain the working of an advanced year round air conditioning system.

*Or*

20. A duct of 15 m length passes air at the rate of  $90 \text{ m}^3 / \text{min}$ . Assuming the friction factor as .05, calculate the pressure drop in the duct in mm of water when (a) The duct is circular of diameter 0.3 m ; (b) The duct is of 0.3 m square section.

(5 × 12 = 60 marks)

**F 4115**

(Pages : 2)

Reg. No.....

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

**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. List the types of production.
2. What is meant by Just-in-Time ?
3. What is meant by vendor rating ?
4. Define Work study.
5. What is meant by Control Chart ?

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Write a note on the applications and benefits of value engineering.
7. Provide a note on the functions of material handling.
8. What is meant by Vendor Managed Inventory ?
9. How is standard time determined ?
10. Mention the objectives of inspection.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain various means to enhance productivity in organizations.

Or

12. Describe various stages in product development process.

Turn over



13. Discuss the necessary principles to be considered for plant layout design.

*Or*

14. Explain in brief different types of material handling equipment.

15. Provide a note on the objectives and functions of purchasing.

*Or*

16. What is meant by ABC analysis ? Explain the procedure involved in carrying out ABC analysis.

17. Explain the role of Ergonomics in the design of work place.

*Or*

18. What is work measurement ? Explain the procedure involved in determining standard time of an activity.

19. What is statistical quality control ? Explain, how control charts help in interpreting the process ?

*Or*

20. Explain, how Quality Function Deployment helps in successful implementation of Total Quality Management philosophy ?

(5 × 12 = 60 marks)

**B.TECH. DEGREE EXAMINATION, NOVEMBER 2016****Seventh Semester**

Branch : Mechanical Engineering

**ME 010 706 L03—THEORY OF VIBRATION (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. Define frequency, cycle and period.
2. What are the various types of damping ?
3. What is force transmissibility ?
4. Specify the importance of vibration Isolation ?
5. List out the causes of vibration.

**(5 × 3 = 15 marks)****Part B***Answer all questions.**Each question carries 5 marks.*

6. Explain in detail about critical speed of shafts.
7. Discuss harmonic motion with suitable sketch.
8. Explain in detail about structural damping.
9. Discuss the axial vibration with suitable sketch.
10. Explain logarithmic decrement.

**(5 × 5 = 25 marks)****Part C***Answer all questions.**Each full question carries 12 marks.*

11. Find the natural frequency of oscillations of a pendulum when it makes small angle oscillations. The pendulum weighs 1 lb and the length of the string is 2 feet. Ignore the mass of the string. Use the energy method for natural frequencies.

*Or***Turn over**

12. Figure 1 shows a spacecraft with four solar panels. Each panel has the dimension of 5 ft.  $\times$  3 ft.  $\times$  1 ft. with a density of 0.1 lb/in<sup>3</sup>, and is connected to the body by aluminum rods of length 12 in. and diameter 1 in. Determine the natural frequency of vibration of each panel about the axis of the connecting rod.

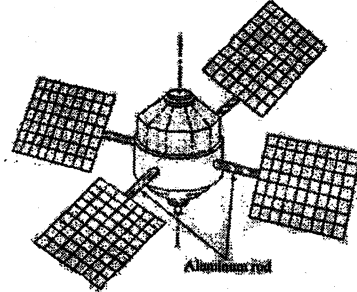


Figure 1

13. An underdamped shock absorber is to be design for a motorcycle of mass 200 kg (Figure. 2). When the shock absorber is subjected to an initial vertical velocity due to a road bump, the resulting displacement-time curve is to be as shown. Find the necessary stiffness and damping constants of the shock absorber if the damped period is to be 2 s and the amplitude  $x_1$  is to be reduced to one-fourth in one half cycle (i.e.,  $x_{1.5} = x_1/4$ ). Also find the minimum initial velocity that leads to a maximum displacement of 250 mm.

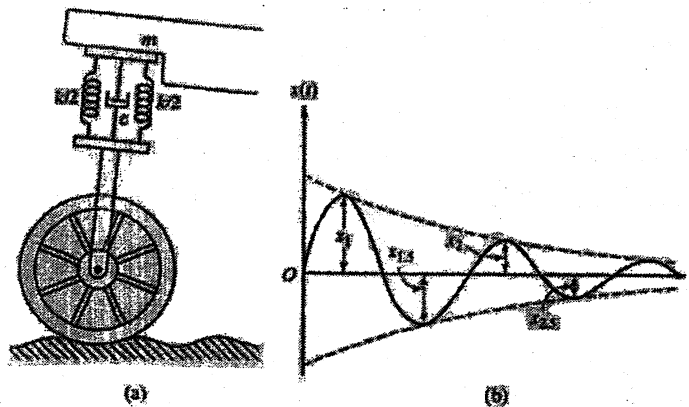


Figure 2

Or

14. A single-degree-freedom system consists of a mass of 25 kg and a spring stiffness of 5000 N/m. The amplitudes of successive cycles are found to be 60, 55, 50, 45, 40, — mm. Determine :
- The nature and magnitude of the damping force.
  - The frequency of the damped vibration.
15. A car and its suspension system shown in Figure 3 are idealized as a damped spring—mass system, with natural frequency 0.5 Hz and damping coefficient 0.2. Suppose the car drives at speed  $V$  over a road with sinusoidal roughness. Assume the roughness wavelength is 10 m, and its amplitude is 20 cm. At what speed does the maximum amplitude of vibration occur, and what is the corresponding vibration amplitude ?

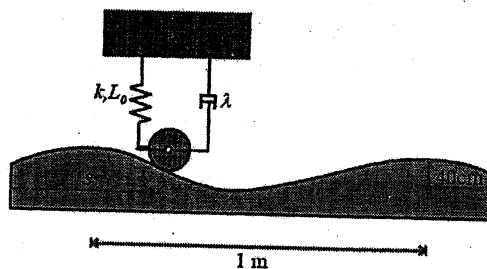


Figure .3

Or

16. A 400 lb duct is to be hung from a ceiling. 30 dB of isolation is desired at all frequencies greater than 100 Hz. Determine the desired stiffness, and static deflection of each isolator spring if four springs are to be used.
17. Calculate the transmissibility at 60 and 120 Hz for a 20,000 lb chiller unit supported by eight springs with 3" static deflection shown in Figure .4

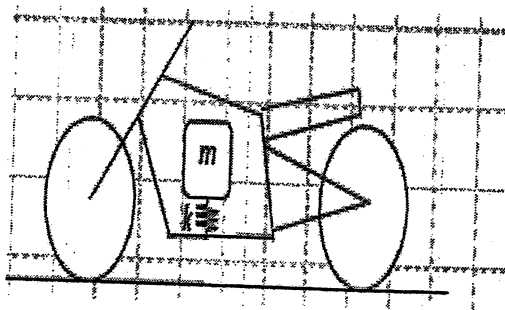


Figure 4

Or

Turn over

18. Find the natural frequencies and mode shapes of a spring mass system of Figure 5 which is constrained to move in the vertical direction.

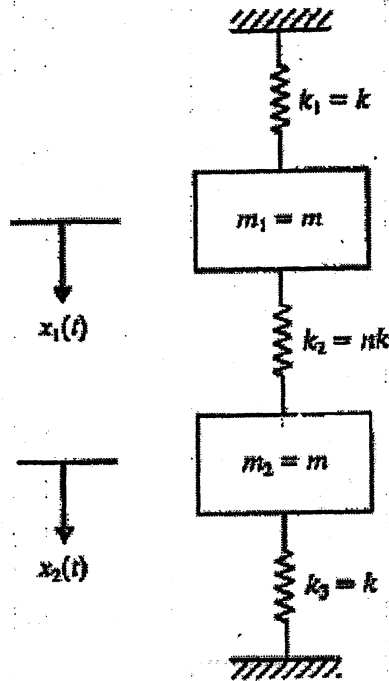


Figure 5

19. A shaft 40 mm. diameter and 2.5 m. long has a mass of 15 kg per m length. It is fixed at both the ends and carries three masses 90 kg, 140 kg and 60 kg at 0.8 m, 1.5 m. and 2 m. respectively from the left support. Taking  $E = 200 \text{ GN/m}^2$ , find the frequency of the transverse vibrations. (Hints :  $\lambda_1 L = 4.730$ ).

Or

20. A long oil rig drill shaft is modelled as a long uniform shaft fixed at the top and free at the bottom. The shaft is 375 m. long and has a material density of  $7800 \text{ kg/m}^3$  and modulus of rigidity 70 GPa. Determine the fundamental natural frequency.

(5 × 12 = 60 marks)

**F 4168**

(Pages : 2)

Reg. No.....

Name.....

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

**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. Define Marketing.
2. Define Strategy.
3. What is an idea ?
4. What are the expectations of consumer ?
5. How selling differs from marketing ?

(5 × 3 = 15 marks)

**Part B**

*Answer all questions.*

*Each question carries 5 marks.*

6. Write a brief note on Advertising.
7. What is the need for Strategic planning ?
8. What is relationship marketing ?
9. Explain the buying situation when new product is launched.
10. Write a note on Sales Quota.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.*

*Each question carries 12 marks.*

11. Explain different concepts of marketing with an example.

*Or*

12. What are the functions of marketing management ? Explain.

Turn over

13. What are the advantages of SWOT analysis ? How it helps in strategic planning ?

*Or*

14. Explain different modules of marketing decision support system.

15. Explain : (i) International Marketing ; and (ii) Product life cycle.

*Or*

16. Describe the advantages and disadvantages of online marketing.

17. What are the factors affecting consumer behavior ? How is each of them handled ?

*Or*

18. Explain the structure of buying center.

19. Explain different selling situations with examples.

*Or*

20. Write a note on Sales personnel.

(5 × 12 = 60 marks)