University of Mumbai

Examination 2020 under cluster 4 (PCE)

Program: BE Mechanical Engineering
Curriculum Scheme: Rev2016
Examination: Final Year Semester VII
Course Code: MEDLO7031 and Course Name: Mechanical Vibrations
Time: 1 hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	A thin circular disk of mass 2 kg and radius 20 cm is suspended at a point on the circumference. The mass-moment-of-inertia about the pivot axis is_____kg-m^2.
Option A:	0.12
Option B:	0.2
Option C:	0.5
Option D:	1
Q2.	A system has a mass 5 kg, and a spring of stiffness 1 kN/m. The undamped time period is _____ seconds.
Option A:	14.14
Option B:	0.444
Option C:	1.414
Option D:	4.44
Q3.	An automobile is found to have a natural frequency of 20 rad/s without load and 17.32 rad/s with load of mass 500 kg. The mass of the automobile by treating it as single degree of freedom is _____ kg.
Option A:	1601.2
Option B:	1058.5
Option C:	1925.4
Option D:	1499.6
Q4.	A spring mass system with mass 2 kg and stiffness 3200 N/m has an initial displacement of x0 = 0. The maximum initial velocity that can be given to the mass without the amplitude of free vibration exceeding a value of 0.1m is _____m/s.
Option A:	40
Option B:	4
Option C:	8
Option D:	80
Q5.	The natural frequency of a spring-mass system on earth is ωn. The natural frequency of this system on the moon (g for moon = g for earth / 6) is _____.
Option A:	0.408 ωn
Option B:	ωn
Option C:	0.204 ωn
Option D:	0.167 ωn
Q6.	Longitudinal vibrations are said to occur when the particles of a body moves
Option A:	Perpendicular to its axis

Option B:	In a circle about its axis
Option C:	Parallel to its axis
Option D:	About its own axis
Q7.	In under damped vibrating system, if x1 and x2 are the successive values of the amplitude on the same side of the mean position, then the logarithmic decrement is equal to _____.
Option A:	ln (x1 / x2)
Option B:	(x1 / x2)
Option C:	log (x1 / x2)
Option D:	log (x1. x2)
Q8.	The theoretical mean position for the case of Coulomb damping is _____
Option A:	is always zero
Option B:	varies alternatively between F/k and -F/k for each half cycle
Option C:	is always 1
Option D:	never exists
Q9.	In a vibrating system, if the actual damping coefficient is 40 N-s/m and critical damping coefficient is 420 N-s/m, the logarithmic decrement is equal to
Option A:	0.2
Option B:	0.4
Option C:	0.8
Option D:	0.6
Q10.	A spring mass damper system has mass, m=2 kg and spring stiffness, k=500 N/m. An initial amplitude of 1 cm is given to the mass and it is released from rest. After 5 complete cycles its amplitude is found to be 0.5 cm. Determine the friction force, assuming the damping to be purely Coulomb.
Option A:	0.25
Option B:	0.125
Option C:	1.125
Option D:	3.125
Q11.	What is the value of damping ratio for the case of Coulomb Damping?
Option A:	Greater than 1
Option B:	Invalid
Option C:	1
Option D:	Less than 1
Q12.	Fill the correct words in the paragraph from the options given below: Envelope of viscous damping is ……. ; and it is ……. in case of Coulomb damping. Vibrating frequency of system for viscous damping is ……. its natural frequency, whereas in case of Coulomb damping, it is ……. its natural frequency. (1) Less than (2) greater than (3) equal to (4) straight line (5) exponential curve (6) parabolic curve Choose the correct sequence.
Option A:	4,5,2,1

Option B:	6,4,2,3
Option C:	5,4,1,3
Option D:	5,6,1,2
Q13.	According to Maxwell reciprocal theorem, for a linear system, which of the following is correct.
Option A:	Aij = Aji
Option B:	Aij < Aji
Option C:	Aij > Aji
Option D:	Aij ≠ Aji
Q14.	A simply supported beam is an example of _____.
Option A:	Discrete system
Option B:	Continuous system
Option C:	Lumped system
Option D:	Undistributed system
Q15.	----------is used to find the natural frquency of the system when transverse point load are acting on the beam or shaft.
Option A:	holzers method
Option B:	dunkerleys method
Option C:	matrix iteration method
Option D:	rayleigh method
Q16.	In a body subjected to transverse vibrations, the stress induced is _____
Option A:	Torsional shear stress
Option B:	Tensile and compressive stress
Option C:	Direct shear stress
Option D:	Non-Linear stress
Q17.	A weight of 50 N is suspended from a spring of stiffness 4000 N/m and is subjected to a harmonic force of amplitude 60 N and frequency 37.7 rad/s. If the static displacement of the spring due to the maximum applied force is 15 mm and natural frequency is 28 rad/s, Find the amplitude of forced motion of the weight.
Option A:	0.01845 mm
Option B:	18.45 mm
Option C:	12.5 mm
Option D:	0.0125 mm
Q18.	A spring-mass system with mass of 10 kg stiffness 5000 N/m is subjected to a harmonic force of amplitude 250 N and excitation frequency. If the static displacement of the spring due to the maximum applied force is 50 mm and the maximum amplitude of the mass is observed to be 100 mm, find the value of excitation frequency.
Option A:	22.36 rad/s
Option B:	50 rad/s
Option C:	15.8 rad/s
Option D:	100 rad/s

Q19.	When shaking force is transmitted through the spring, damping becomes detrimental when the ratio of its frequency to the natural frequency is greater than
Option A:	1.414
Option B:	0.25
Option C:	0.5
Option D:	1
Q20.	A 75 kg machine is mounted on springs of stiffness k = 1176000 N/m with an assumed damping factor of 0.20. A 2 kg piston within the machine has a reciprocating motion with a stroke of 0.08 m and a speed of 3000 rpm. Assuming the motion of the piston to be harmonic, determine the vibratory force transmitted to the foundation.
Option A:	5.6 cm
Option B:	2.7 cm
Option C:	7.5 cm
Option D:	10.2 cm
Q21.	An accelerometer is an instrument used to measure the _____ of a vibrating body.
Option A:	displacement
Option B:	velocity
Option C:	momentum
Option D:	acceleration
Q22.	In FFT Spectrum Analyzer, FFT stands for _____.
Option A:	Frequency Fourier Transform
Option B:	Fast Fourier Transform
Option C:	Fast Fourier Transmission
Option D:	Frequency Fourier Transmission
Q23.	The frequency range of a vibrometer is generally _____.
Option A:	10 Hz to 50 Hz
Option B:	1 Hz to 5 Hz
Option C:	100 Hz to 500 Hz
Option D:	1000 Hz to 5000 Hz
Q24.	The geometric points in state space to which chaitic trajectories are attracted are called
Option A:	Poincare sections
Option B:	trajectory attractors
Option C:	strange attractors
Option D:	graphical attractors
Q25.	Oscillations whose frequencies are 2, 3, ….,n times the forcing frequency are called
Option A:	damped oscillations
Option B:	subharmonic oscillations
Option C:	superharmonic oscillations
Option D:	free oscillations

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Question	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	B
Q3.	D
Q4	B
Q5	B
Q6	C
Q7	A
Q8.	B
Q9.	D
Q10.	B
Q11.	B
Q12.	C
Q13.	A
Q14.	B
Q15.	D
Q16.	B
Q17.	B
Q18.	C
Q19.	A
Q20.	B
Q21.	D
Q22.	B
Q23.	B
Q24.	C
Q25.	C