University of Mumbai
Examination 2020 under cluster 4 (PCE)

Program: BE Mechanical Engineering
Curriculum Scheme: **Rev2012**
Examination: Third Year **Semester VI**
Course Code: **MEC603** 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.	What causes vibrations?
Option A:	When spring force = damping force
Option B:	When spring force > damping force
Option C:	When heat energy is converted to work
Option D:	When Kinetic Energy and Potential Energy get converted to each other
Q2.	When a certain mass was placed very gradually on a platform to which a spring is connected, the static deflection was observed to be 50 mm. What is the linear frequency?
Option A:	2.23 rad/s
Option B:	14 rad/s
Option C:	2.23 Hz
Option D:	14 Hz
Q3.	_____ are also known as Transient Vibrations.
Option A:	Undamped
Option B:	Damped
Option C:	Torsional
Option D:	Transverse
Q4.	The static deflection of a spring-mass system is 0.5 m. Once disturbed, the time-period of vibration is found to be _____ seconds.
Option A:	4.43
Option B:	1.42
Option C:	2.21
Option D:	2
Q5.	An instrument has a natural frequency of 10 Hz. Maximum acceleration of the system is observed to be 24 m/s^2. The maximum displacement of the system is _____mm.
Option A:	0.00608
Option B:	0.0608
Option C:	0.608
Option D:	6.08
Q6.	The reduction of the amplitude ratio in the presence of damping is very significant _____.
Option A:	near $\omega = \omega n$
Option B:	near $\omega = \omega d$
Option C:	near $\omega = 0$

Option D:	near ω = infinity
Q7.	Two viscous dampers with coefficients c1 and c2 are connected in series. The equivalent damping coefficient (c) is _____
Option A:	1/c = 1/c1 + 1/c2
Option B:	c = c1 + c2
Option C:	c = c1.c2
Option D:	c = c1 / c2
Q8.	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:	0.125
Option B:	0.25
Option C:	1.125
Option D:	3.125
Q9.	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:	5,4,1,3
Option C:	6,4,2,3
Option D:	5,6,1,2
Q10.	There are two dampers which are connected in parallel combination and placed between the moving parts of machine having maximum relative velocity of 2 m/s. Find the maximum damping force exerted by the combination if damping coefficient of the dampers are 7 N-s/m and 14 N-s/m.
Option A:	4.67 N
Option B:	10.5 N
Option C:	21 N
Option D:	42 N
Q11.	A continuous system has _____ number of degrees of freedom.
Option A:	0
Option B:	1
Option C:	2
Option D:	infinite
Q12.	Rayleigh's method can be used for estimation of natural frequency for_____ vibrations.
Option A:	Random

Option B:	Transverse
Option C:	Torsional
Option D:	Non-linear
Q13.	A _____ vibration system has zero fundamental natural frequency.
Option A:	Definite
Option B:	Semi-definite
Option C:	Positive
Option D:	Negative
Q14.	In free torsional vibration of two rotor system, node is a section of the shaft where torsion vibration is _____.
Option A:	maximum
Option B:	minimum
Option C:	zero
Option D:	can be any value
Q15.	A vibrometer having a natural frequency of 4 rad/s and $\xi = 0.3$ is attached to a structure that performs a harmonic motion. If the difference between the maximum and the minimum recorded values is 8 mm, find the amplitude of motion of the vibrating structure when its frequency is 44 rad/s.
Option A:	3.82 mm
Option B:	3.90 mm
Option C:	3.97 mm
Option D:	4.05 mm
Q16.	In vibration isolation system, if $(\omega/\omega n) > 1$, then phase difference between the transmitted force and the disturbing force is _____ degrees.
Option A:	0
Option B:	90
Option C:	180
Option D:	270
Q17.	Vibrometer is a _____ natural frequency transducer.
Option A:	High
Option B:	Low
Option C:	Zero
Option D:	Negative
Q18.	For experiencing the least vibrations, a driver should drive his vehicle at _____ speed.
Option A:	equal to resonance speed
Option B:	less than resonance speed
Option C:	between frequency ratio of 1 to $\sqrt{2}$
Option D:	greater than frequency ratio of $\sqrt{2}$
Q19.	In order to have a complete balance of the several revolving masses in different planes, _____.

Option A:	the resultant force must be zero
Option B:	the resultant couple must be zero
Option C:	both the resultant force and couple must be zero
Option D:	reciprocating forces must be zero
Q20.	Multi-cylinder engines are desirable because_____.
Option A:	balancing problems & flywheel size are reduced
Option B:	only balancing problems are reduced
Option C:	only flywheel size is reduced
Option D:	flywheel size remains the same
Q21.	Let the disturbing mass be 100 kg and the radius of rotation be 10 cm and the rotation speed be 50 rad/s, then calculate the centrifugal force in kN.
Option A:	50
Option B:	25
Option C:	50,000
Option D:	25,000
Q22.	What is NOT the effect of unbalanced forces?
Option A:	Load on bearings
Option B:	Dangerous vibrations
Option C:	Stresses in various members
Option D:	Violation of conservation of mass principle
Q23.	Rotating shaft tends to vibrate violently at whirling speeds because _____.
Option A:	the shaft is rotating at varying speeds
Option B:	bearing center line coincide with the shaft axis
Option C:	the system is unbalanced
Option D:	resonance is caused
Q24.	When a disc is supported in-between a shaft, the critical speed of the shaft is equal to natural frequency of the system in _____.
Option A:	longitudinal vibrations
Option B:	transverse vibrations
Option C:	non-linear vibrations
Option D:	torsional vibrations
Q25.	Which among the following parameters is NOT used to measure vibration?
Option A:	Frequency
Option B:	Phase
Option C:	Amplitude
Option D:	Static Deflection

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