University of Mumbai

Examination 2020 under cluster 4 (PCE)

Program: BE Mechanical Engineering
Curriculum Scheme: **Rev2016**
Examination: Third Year **Semester V**
Course Code: **MEC504** and Course Name: **Dynamics of Machinery**
Time: 1 hour Max. Marks: 50

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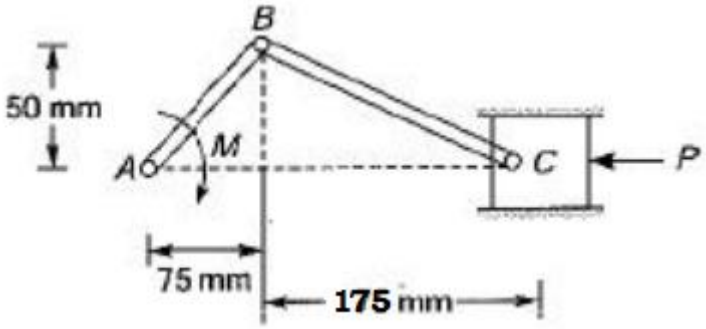
Note to the students:- All the Questions are compulsory and carry equal marks .

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 ω = ωn
Option B:	near ω = ωd
Option C:	near ω = 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.	Calculate gyroscopic couple acting on a disc which has radius of 135 mm. Angular and precessional velocities are 15 rad/s and 7 rad/s respectively. Assume density = 7810 kg/m^3 and thickness of disc = 30 mm.
Option A:	12.83 Nm
Option B:	10.99 Nm
Option C:	11 Nm
Option D:	Incomplete data
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.	For isochronous Hartnell governor
Option A:	(mg + S1)/(mg + S2) = r1/r2
Option B:	(mg - S1)/(mg - S2) = r2/r1
Option C:	S1/S2 = r1/r2
Option D:	S2/S1 = r1/r2
Q12.	Effort of a governor is the:
Option A:	mean force exerted at the sleeve for a given percentage change of speed
Option B:	work done at the sleeve for maximum equilibrium speed
Option C:	mean force exerted at the sleeve for maximum equilibrium speed
Option D:	work done at the sleeve for minimum equilibrium speed
Q13.	The engine of an aeroplane rotates in clockwise direction when seen from the tail

	end and the aeroplane takes a turn to the right. The effect of gyroscopic couple on the aeroplane will be:
Option A:	to dip the nose and tail
Option B:	to raise the nose and tail
Option C:	to raise the nose and dip of the tail
Option D:	to dip the nose and raise the tail
Q14.	A couple M of magnitude 1.5 kN-m is applied to the crank of the engine system shown in figure below. What is the force P required to hold the system in equilibrium? 
Option A:	19 kN
Option B:	20 kN
Option C:	21 kN
Option D:	22 kN
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 √2
Option D:	greater than frequency ratio of √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.	A
Q10.	D
Q11.	A
Q12.	A
Q13.	D
Q14.	C
Q15.	C
Q16.	C
Q17.	B
Q18.	D
Q19.	C
Q20.	A
Q21.	B
Q22.	D
Q23.	D
Q24.	B
Q25.	D