

Program: BE Mechanical Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code:MEC504 Course Name: Dynamics of Machinery

2909_R16_Mech_V_MEC504_QP

Time: 1 hour

Max. Marks: 50

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

Q1.	The function of a governor is to
Option A:	store energy and give up whenever required
Option B:	regulate the speed during one cycle of prime mover
Option C:	decrease variation of speed
Option D:	adjust variation of speed by varying the fuel supply to the engine
Q2.	In a slider crank mechanism, the length of the crank and connecting rod are 150 mm and 600 mm respectively. The crank position is 60° from inner dead centre. The obliquity ratio of engine is
Option A:	4.5
Option B:	4
Option C:	3.5
Option D:	5
Q3.	An electrical switch gear is supported by a crane through a steel cable of length 4 m and diameter 0.01 m. If the natural time period of axial vibration of the switch gear is found to be 0.1 s, find the mass of the switch gear if Modulus of Elasticity for the material is $2.07 \times 10^{11} \text{ N/m}^2$
Option A:	10.29 kg
Option B:	1029.53 kg
Option C:	327.71 kg
Option D:	1310.84 kg
Q4.	The distance between the center of gravity of the rotor and its geometric center is called as
Option A:	Static deflection
Option B:	Dynamic deflection
Option C:	Eccentricity
Option D:	Centricity

Q5.	Watt governors can be used for a maximum speed upto
Option A:	100rpm
Option B:	250 rpm
Option C:	400 rpm
Option D:	800 rpm
Q6.	The essential condition of placing the two masses is_____, so that the system becomes dynamically equivalent is where l_1 and l_2 = Distance of two masses from the centre of gravity of the body, and k_g = Radius of gyration of the body.
Option A:	$l_1 l_2 = k_g^2$
Option B:	$l_1 l_2 = k_g$
Option C:	$l_1 + l_2 = k_g$
Option D:	$l_1 + l_2 = k_g^2$
Q7.	When the speed of the shaft is less than the critical speed, the deflection of shaft (y) and the eccentricity (e) are _____
Option A:	On same side of the geometric center of the rotor
Option B:	On the opposite side of the geometric center of the rotor
Option C:	On the geometric center of the rotor
Option D:	Anywhere but coincident
Q8.	Calculate natural frequency of damped vibration, if damping factor is 0.52 and natural frequency of the system is 30 rad/sec which consists of machine supported on springs and dashpots.
Option A:	25.62 rad/sec
Option B:	20.78 rad/sec
Option C:	14.4 rad/sec
Option D:	15.33 rad/sec
Q9.	Which of the following is an example of undamped free vibration?
Option A:	Simple Pendulum oscillating in water
Option B:	A spring and Mass system suspended freely
Option C:	A spring mass and damper system
Option D:	Shock absorber of a two-wheeler
Q10.	The acceleration of the piston in a reciprocating steam engine is given by _____ where ω = Angular velocity of the crank, r = Radius of the crank, θ = Angle turned by the crank from inner dead centre, and n = Ratio of crank radius length of connecting rod.
Option A:	$\omega r \left(\sin \theta + \frac{\sin 2\theta}{n} \right)$
Option B:	$\omega^2 r \left(\cos \theta + \frac{\cos 2\theta}{n} \right)$

Option C:	$\omega r \left(\cos \theta + \frac{\cos 2\theta}{n} \right)$
Option D:	$\omega^2 r \left(\sin \theta + \frac{\sin 2\theta}{n} \right)$
Q11.	Dynamic forces are due to
Option A:	Acceleration of various components
Option B:	Weight of the components
Option C:	Reactive Gyroscopic Couple acting between the bearings
Option D:	Active Gyroscopic Couple acting between the bearings
Q12.	Transmissibility ratio is defined as ratio of magnitude of
Option A:	Applied force / Transmitted force
Option B:	Natural Frequency / Frequency of external force
Option C:	Frequency of external force / Natural Frequency
Option D:	Transmitted force / Applied force
Q13.	Measure of vibration has become important. Which of the following statement is not the reason for the same?
Option A:	Measurement of natural frequencies is important to select operational speed of a machine.
Option B:	Measure is important so that machines should not be designed to run at high speeds.
Option C:	Measure helps in design of vibration isolation systems.
Option D:	Impact of magnitude of natural calamities can be estimated.
Q14.	The rate of decay of amplitude per cycle in case of coulomb damping is?
Option A:	Linearly increases
Option B:	Linearly decreases
Option C:	Remains constant
Option D:	Exponentially decreases
Q15.	A mass m is attached to two identical springs having spring constant k attached parallel then the natural frequency ω of this single degree of freedom system is
Option A:	$\sqrt{\frac{k}{m}}$
Option B:	$\sqrt{\frac{2k}{m}}$
Option C:	$\sqrt{\frac{4k}{m}}$

Option D:	$\sqrt{\frac{k}{2m}}$
Q16.	In a machine rotating at 800 rpm, force transmitted to foundation is $1/10^{\text{th}}$ of impressed force. Find natural frequency of machine. Neglect damping.
Option A:	50 rad/sec
Option B:	25 rad/sec
Option C:	75 rad/sec
Option D:	100 rad/sec
Q17.	While balancing of several masses rotating in different planes graphically,
Option A:	Centrifugal Force Polygon is drawn first
Option B:	Couple Polygon is drawn first
Option C:	Polygons are not required in graphical method
Option D:	The sequence doesn't matter
Q18.	Governor Effort for a hartnell governor having spring force S and sleeve lift c is
Option A:	Directly proportional to S
Option B:	Directly proportional to S^2
Option C:	Inversely proportional to S
Option D:	Inversely proportional to S^2
Q19.	For an undamped system, the velocity leads the displacement by
Option A:	Π
Option B:	$\pi/2$
Option C:	2π
Option D:	$\pi/4$
Q20.	For frequency ratios less than 1, ideal instrument to measure vibration would be
Option A:	Seismometer
Option B:	Velometer
Option C:	Accelerometer
Option D:	Vibrometer
Q21.	Assertion (A) : While taking a sharp turn on a two wheeler at high speed the rider has to bend towards the ground
	Reason (R) : This increases the gyroscopic couple which tends to stabilize the vehicle

Option A:	A is True, And R is correct explanation of A
Option B:	A is True, R is false
Option C:	A and R both are false
Option D:	A is false, R is true
Q22.	The amplitude of free successive oscillations with coulomb damping will follow
Option A:	Linear progression
Option B:	Geometric progression
Option C:	Harmonic progression
Option D:	Arithmetic progression
Q23	In a system damping factor is 0.25, natural frequency is 20 rad/sec, frequency of periodic excitation is 40 rad/sec. Find transmissibility ratio
Option A:	12.5 %
Option B:	30.8 %
Option C:	44.7 %
Option D:	18.9 %
Q24.	A vehicle suspension system consists of a spring and a damper. The stiffness of the spring is 3.6 kN/m and the damping constant of the damper is 400 Ns/m. If the mass is 50 kg, then the damping factor (d) and damped natural frequency (fn), respectively, are
Option A:	0.471 and 1.19 Hz
Option B:	0.471 and 7.48 Hz
Option C:	0.666 and 1.35 Hz
Option D:	0.666 and 8.50 Hz
Q25	A disc having mass moment of 1 kg-m^2 , spinning on its axis at 20 rad/s will undergo precession when a torque 180 N-m is applied about an axis normal to it at an angular speed of
Option A:	8 rad/sec
Option B:	4.5 rad/sec
Option C:	20 rad/sec
Option D:	9 rad / sec