Sample Question Bank – Dynamics of Machinery (CBCGS/CBCGS-H)

1. In a Hartnell governor, if the stiffness of spring is increased, the governor will _____. (1Mark)
(a) become more sensitive (b) become less sensitive (c) remain unaffected (d) start hunting.

2. The function of a governor is to _____. (1 Mark)
(a) reduce the speed fluctuations during a cycle
(b) maintain the prime mover speed within prescribed limits
(c) not to influence the speed of the prime mover
(d) not to control the variation in load on the prime mover.

3. **.** If the ball masses of a governor have same equilibrium speed for all the radii of rotation, it is said to be _____. (1 Mark)
(a) stable (b) hunting (c) isochronous (d) sensitive.

4. The length of the upper arm of a Watt governor is 400 mm and its inclination to the vertical is 30°. Percentage increase in speed, if the balls rise by 20 mm is _____. (2 Marks)
(a) 3 % (b) 4% (c) 5% (d) 6%

5. When a watt governor rotates at 60 r.p.m. Governor height will be _____. Change in governor height when its speed increases to 61 r.p.m. will be _____. (2 Marks)
(a) 0.211 m, 0.24 m (b) 0.248 m, 0.24 m (c) 0.24 m, 0.211 m (d) 0.248 m, 0.211 m

6. The pitching motion of a ship means _____. (1 Mark)
(a) oscillatory motion of ship about longitudinal axis.
(b) oscillatory motion of ship about transverse axis.
(c) turning of complete ship in a curved path to the right.
(d) turning of complete ship in a curved path to the left.

7. Angle of heel is the _____. (1 Mark)
(a) angle through which precession takes place.
(b) angle through which line of centres of front wheel is rotated w.r.t. horizontal
(c) angle through which plane of two-wheeler is inclined to longitudinal vertical plane
(d) angle through which direction of motion of two-wheeler changes w.r.t. previous direction

8. Gyroscopic Couple acting on a disc with M.I. 'I' and rotating with angular speed 'ω' when undergoes precessional motion with angular speed 'ω_p is _____. (1 Mark)
(a) $I \omega \omega_p^2$ (b) $I \omega \omega_p$ (c) $I \omega^2 \omega_p$ (d) $I \omega \omega_p/2$

9. A naval ship makes a half circle of 100 m radius towards left when sailing at 400 km/h. The M.I. of ship is 124.87 kg-m^2. Engine rotates at 3000 r.p.m. clockwise when viewed from rear. Gyroscopic couple acting on ship will be _____. (2 Marks)
(a) 43.54 kN-m (b) 34.54 kN-m (c) 53.44 kN-m (d) 35.44 kN-m

10. The rotor of a motor used for electric traction weighs 4900 N and has a radius of gyration of 20 cm. The centre of mass of the rotor is midway between the bearings. The speed of the motor and train are 1500 r.p.m. and 75 km/hr respectively. Gyroscopic couple acting on the rotor is _____. (2 Marks)
(a) 436 N-m (b) 643 N-m (c) 346 N-m (d) 634 N-m

11. In a viscous damped vibrations, if the critical damping coefficient is 6283 Ns/m and natural frequency is 10 rad/s, mass of the system will be _____. (2 Marks)
(a) 50 kg (b) 75 kg (c) 100 kg (d) 125 kg

12. Damping constant is zero when there is _____. (1 Mark)
(a) damping (b) no damping (c) resonance (d) critical damping

13. In force vibrations, amplitude of vibration is _____ the static deflection. (1 Mark)
(a) directly proportional to
(b) inversely proportional to
(c) half of
(d) twice of

14. The magnification factor is the ratio of the amplitude due to forced vibrations to the deflection due to _____. (1 Mark)
(a) Torque
(b) twisting moment
(c) static force
(d) dynamic force

15. Unit of damping factor is _____. (1 Mark)
(a) Ns/m
(b) N/sm
(c) Nm/s
(d) No unit

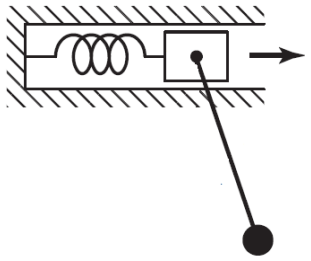
16. For underdamped case of vibrations roots of characteristic equation are _____. (1 Mark)
(a) real & equal
(b) real & unequal
(c) complex conjugate
(d) independent of equation

17. In coulomb damped vibrations, amplitude of vibrations _____. (1 Mark)
(A) increases linearly with time
(B) decreases linearly with time
(C) decreases exponentially with time
(D) increases exponentially with time

18. In a damped free vibrations, mass is 2 kg, and spring stiffness is 100 N/m. It is observed that an initial amplitude of 100 mm is reduced to 1 mm in 10 oscillations then damping factor of the system is _____. (2 Marks)
(a) 0.073 (b) 0.065 (c) 0.056 (d) 0.037

19. In under damped vibrating system, if X_1 and X_2 are the successive values of the amplitudes on the same side of the mean position, then the logarithmic decrement is given by _____. (1 Mark)
(a) log (X_1/ X_2)
(b) ln (X_1/ X_2)
(c) log (X_1. X_2)
(d) ln (X_1.X_2)

20. No. of degrees of freedom for the system shown in Fig is/are _____. (1 Mark)



(a) 1
(b) 0
(c) 2
(d) 3

21. Dunkerleys method is _____ method of solving governing differential equations. (1 Mark)
(a) matrix (b) numerical (c) exact (d) trial & error

22. The damped vibration record of a spring mass dashpot system shows the following data:- Amplitude on second cycle = 1.20 cm; Amplitude on third cycle = 1.05 cm; Spring stiffness, k = 7840 N/m; Mass on the spring, m = 2 kg. _____ is the logarithmic decrement in the system.
(a) 0.339 (b) 0.266 (c) 0.133 (d) 0.065

23. Frequency of vibrations in spring mass system _____. (1 Mark)
(a) depends upon mass
(b) depends upon mass and stiffness
(c) depends upon mass, stiffness and initial amplitude
(d) independent of mass

24. In balancing of vibrations in rotating systems, one balancing mass _____. (1 Mark)
(a) is added in single plane only
(b) can be added in multiple planes
(c) is added on one side of plane with unbalanced mass
(d) can be added on both sides of plane with unbalanced mass

25. Accelerometer has natural frequency 15 kHz. The natural frequency it can measure within 1% accuracy when damping ratio is 0.7 is _____. (2 Marks)
(a) 7.335 Hz (b) 3.735 Hz (c) 5.373 Hz. (d) 5.735 Hz.