



JSSC JE

Mechanical Engineering

Mega Mock Test - 1

(June 18th - June 19th 2022)

Questions &
Answer Key

1. An adjustable blade propeller turbine is called as _____.
- A. Banki turbine
 - B. Pelton turbine
 - C. Kaplan turbine
 - D. Francis-Pelton turbine

Ans. C

2. Match the following

	Types of Mechanisms		Motion Achieved
P.	Scott-Russel Mechanism	1.	Intermittent Motion
Q.	Geneva Mechanism	2.	Quick Return Mechanism
R.	Off-set slider-crank Mechanism	3.	Simple Harmonic Motion
S.	Scotch Yoke Mechanism	4.	Straight Line Motion

- A. P-2 Q-3 R-1 S-4
- B. P-3 Q-2 R-4 S-1
- C. P-4 Q-1 R-2 S-3
- D. P-4 Q-3 R-1 S-2

Ans. C

3. In modern steam generator, the correct path of gases from boiler furnace to chimney is _____.

- A. Economizer, Air preheater, Superheater and Chimney
- B. Boiler furnace, Superheater, Air preheater, Economizer and Chimney
- C. Boiler furnace, Air preheater, Superheater, Economizer and Chimney
- D. Boiler furnace, Superheater, Economizer, Air preheater and Chimney

Ans. D

4. For an air-conditioned space, RTH = 100 kW, RSHF = 0.75, volume flow rate = 100 m³/min, and indoor design specific humidity is 0.01 kg/kg of dry air. What is the specific humidity of the supply air (in kg/kg of dry air)_____?

- A. 0.010
- B. 0.0075
- C. 0.005
- D. 0.0025

Ans. C

5. Fanno line flow is a flow in a constant area duct
- A. with friction and heat transfer but in the absence of work
 - B. with friction and heat transfer accompanied by work
 - C. with friction but in the absence of heat transfer or work
 - D. without friction but accompanied by heat transfer and work

Ans. C

6. In Taylor's tool life equation $VT^n = C$, the constants n and C depend upon

- 1. Work piece material
 - 2. Tool material
 - 3. cutting condition
- A. 1, 2, and 3
 - B. 1 and 2 only
 - C. 2 and 3 only
 - D. 1 and 3 only

Ans. A

7. A stone of mass m at the end of a string of length l is whirled in a vertical circle at a constant speed. The tension in the string will be maximum when the stone is
- A. At the top of the circle
 - B. Half-way down from the top
 - C. Quarter-way down from the top
 - D. At the bottom of the circle

Ans. D

8. The density of air at 10°C and 1 MPa abs , in SI unit is
- A. 1.231
 - B. 12.31
 - C. 118.4
 - D. 65.0

Ans. B

9. An axially loaded bar is subjected to a normal stress of 173 MPa . The shear stress in the bar is
- A. 75 MPa
 - B. 86.5 MPa
 - C. 100 MPa
 - D. 122.3 MPa

Ans. B

10. The cross-section of a bar is subjected to an uniaxial tensile stress ' P '. The tangential stress on a plane inclined at θ to the cross-section the bar would be.

- A. $\frac{P \sin 2\theta}{2}$
- B. $P \sin 2\theta$
- C. $\frac{P \cos 2\theta}{2}$
- D. $P \cos 2\theta$

Ans. A

11. A vessel of volume 1 m^3 contains oxygen (molecular weight = 32) at $P = 1\text{ bar}$ and $T = 74^\circ\text{C}$. The mass of oxygen in the vessel is (take universal gas constant as 8314 J/mol-k)
- A. 40 kg
 - B. 3 kg
 - C. 1.2 kg
 - D. 1 kg

Ans. C

12. The crippling load for both ends fixed long column is given by_____.

- A. $\frac{\pi^2 EI}{l^2}$
- B. $\frac{\pi^2 EI}{4l^2}$
- C. $\frac{4\pi^2 EI}{l^2}$
- D. $\frac{2\pi^2 EI}{l^2}$

Ans. C

13. Stream A of moist air has specific humidity of 0.005 Kg/Kg of dry air and dry bulb temperature of 25°C . Stream B of moist air has specific humidity of 0.005 Kg/Kg of dry air and dry bulb temperature of 35°C . Then _____.
- A. Stream A has lower relative humidity and lower dew point temperature
 - B. Stream A has same relative humidity and lower dew point temperature
 - C. Stream A has higher relative humidity and same dew point temperature
 - D. Stream A has lower relative humidity and same dew point temperature

Ans. C

14. When the workpiece has fine grain structure, tool life will_____ (when compared to workpiece having comparatively larger grains).
- A. increase
 - B. remain the same
 - C. decrease
 - D. none of these

Ans. C

15. Consider the following systems:

- 1) An electric heater
- 2) A gas turbine
- 3) A reciprocating compressor

The steady flow energy equation can be applied to which of the above systems?

- A. 1 and 2 only
- B. 1 and 3 only
- C. 1, 2 and 3
- D. 2 and 3 only

Ans. C

16. In a Morse test on a 2-cylinder, 2-stroke SI engine, the brake power is 9 kW and the BHP of individual cylinders with spark cutoff are 4.25 kW and 3.75 kW, respectively. The mechanical efficiency of the engine is
- A. 90%
 - B. 80%
 - C. 52.5%
 - D. 45.5%

Ans. A

17. Two links have angular velocity of 20 rad/s and 15 rad/s both in opposite directions. If the radius of the pin at O is 10mm, O is point where two links are connected, determine the rubbing velocity at the joint_____?
- A. 0.35 m/s
 - B. 0.30 m/s
 - C. 0.20 m/s
 - D. 0.05 m/s

Ans. A

18. Cryogenics refers to
- A. refrigeration at low temperature
 - B. thermodynamic analysis at low temperature
 - C. engineering field concerned with equipment in the range of -180°C to absolute zero
 - D. Refrigeration under vacuum conditions

Ans. C

19. In all reversible process, entropy of the system _____.
- A. Increases
 - B. Decreases
 - C. zero
 - D. can be zero, positive or negative

Ans. D

20. The compression members always tend to buckle in the direction of
- A. Axis load
 - B. Perpendicular to the axis of load
 - C. Minimum cross-section
 - D. Least radius of gyration

Ans. D

21. Which of the following statement(s) is/are correct?

- A. The 2nd Law of Thermodynamics states that there exists no engine with 100% efficiency.
- B. The free expansion of gas is reversible process.
- C. There exists a process whose sole result is absorption of heat from a reservoir and the complete conversion of the heat into work.
- D. None of these.

Ans. A

22. For a fixed beam, how many reactions are there at the fixed end?

- A. 0
- B. 1
- C. 2
- D. 3

Ans. D

23. What will be the efficiency of the Carnot's engine that draws 1500 J of heat energy from a reservoir at 420 K and rejects 1000 J of heat during each cycle?

- A. 40%
- B. 33%
- C. 25%
- D. 21%

Ans. B

24. The relation between the number of links (L) and number of pairs (P) forming a kinematic chain having only lower pairs is :

- A. $L = 2P - 3$
- B. $L = 2P - 2$
- C. $L = 2P - 4$
- D. $L = 3 - 2P$

Ans. C

25. Match the following, the % of carbon solubility in various form of iron is given below

1. δ ferrite	a. 0.025%
2. γ austenite	b. 2%
3. α ferrite	c. 0.008%
4. α ferrite at room temperature	d. 0.1 %

- A. 1-c,2-b,3-a,4-d
- B. 1-a,2-c,3-b,4-d
- C. 1-d,2-b,3-a,4-c
- D. 1-a,2-b,3-c,4-d

Ans. C

26. The weight percentage of α in iron-carbon diagram in mixture of pearlite and cementite at 0.8% of carbon and 720 °C is _____. (Assume left intercept of tie line is at 0.008 %

- A. 75
- B. 12
- C. 28
- D. 88

Ans. D

27. If the patterns of stream lines is straight and diverging (with respect to time), then the acceleration present will be

- A. No acceleration
- B. Tangential acceleration only
- C. Tangential convective acceleration
- D. Tangential local acceleration

Ans. D

Ans. A

34. Consider the following statements with reference to combustion and performance in a four-stroke petrol engine:

- 1) The auto-ignition temperature of petrol as a fuel is higher than that of diesel oil as a fuel.
- 2) The highest compression ratio of petrol engines is constrained by the possibility of detonation.
- 3) A petrol engine is basically less suitable for supercharging than a diesel engine.

Which of the above statements are correct?

- | | |
|-----------------|-----------------|
| A. 1 and 2 only | B. 1 and 3 only |
| C. 2 and 3 only | D. 1, 2 and 3 |

Ans. D

35. If the value of volumetric strain is 0, then which of the following condition is possible?

- | | |
|-------------------------------|---|
| A. Poisson Ratio, $\mu = 0.5$ | B. $\sigma_x + \sigma_y + \sigma_z = 0$ |
| C. Either (A. or (b) | D. None of these |

Ans. C

36. A device which increases intensity of pressure by means of hydraulic energy available from large amount of water at low pressure is _____.

- | | |
|---------------|--------------------------|
| A. Jet pump | B. Hydraulic intensifier |
| C. Draft tube | D. Fluid coupling |

Ans. B

37. The arc length in arc welding should be equal to

- A. rod diameter
- B. 1.5 times of rod diameter
- C. 3 times of rod diameter
- D. 4.5 times of rod diameter

Ans. A

38. The float in the carburettor of a petrol engine controls_____.

- A. Flow rate of air
- B. Level of the petrol in the float chamber.
- C. Flow rate of air-fuel mixture
- D. None of these

Ans. B

39. The real gas approaches the ideal gas behavior, when

- | | |
|--|--|
| A. $P \rightarrow 0$ or $T \rightarrow \infty$ | B. $P \rightarrow \infty$ or $T \rightarrow 0$ |
| C. $P, T \rightarrow 0$ | D. $P, T \rightarrow \infty$ |

Ans. A

40. Angle formed by the flank and a plane at right angles to the drill axis is

- | | |
|------------------------|----------------|
| A. Lip clearance angle | B. Rake Angle |
| C. Helix angle | D. Point Angle |

Ans. A

41. If the velocity of projection is u m/sec and the angle of projection is θ , the maximum height of the projectile on a horizontal plane is

A. $\frac{u^2 \cos^2 \theta}{2g}$

B. $\frac{u^2 \sin^2 \theta}{2g}$

C. $\frac{u^2 \tan^2 \theta}{2g}$

D. $\frac{u^2 \sin^2 \theta}{g}$

Ans. B

42. List-1 gives 4 dimensional numbers and List-2 gives types of forces which constitutes this number. match them accordingly:

List-1

- a) Euler Number
- b) Froude number
- c) Mach Number
- d) Weber Number

List-2

- 1) pressure forces
- 2) Gravity force
- 3) viscous force
- 4) surface tension
- 5) Elastic force

A. a2-b1-c3-d4

B. a1-b2-c5-d4

C. a3-b1-c2-d4

D. a2-b3-c4-d1

Ans. B

43. Find the change in the entropy in the following process 100 gm of ice at 0°C melts when dropped in a bucket of water at 50°C (Assume temperature of water does not change) (Take Latent heat of fusion of water = 80 cal/gm)

A. - 4.5 cal/K

B. + 4.5 cal/K

C. +5.4 cal/K

D. - 5.4 cal/K

Ans. B

44. By what process, maximum hardness is obtained for a component made of steel ?

A. Cyaniding

B. Nitriding

C. Carburizing

D. None of the above

Ans. B

45. The shear force diagram of a cantilever beam subjected to a bending moment M at the free end will be

A. Straight line along horizontal axis

B. Rectangle

C. Triangle

D. Parabola

Ans. A

46. Degree of freedom for rolling with slipping is?

A. 1

B. 0

C. -1

D. 2

Ans. B

56. Which of the following welding method uses a pool of molten metal?
- A. Carbon arc welding
 - B. Submerged arc welding
 - C. TIG arc welding
 - D. MIG arc welding

Ans. B

57. Which is not a part of petrol engine?
- A. Valve mechanism
 - B. Fuel injector
 - C. Induction coil
 - D. Air filter

Ans. B

58. Delta iron exists in the temperature range of _____.
- A. 0°C to 768°C
 - B. 768°C to 900°C
 - C. 900°C to 1400°C
 - D. 1400°C to 1530°C

Ans. D

59. Double block brake is a type of
- A. Band brake
 - B. Internal expanding shoe brake
 - C. Shoe brake
 - D. None of the above

Ans. C

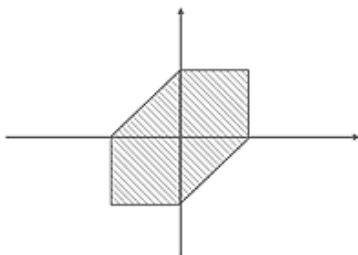
60. Closed feedwater heaters are _____ heat exchangers.
- A. parallel flow
 - B. shell-and-tube
 - C. counter flow
 - D. cross- flow

Ans. B

61. Which type of compressor is commonly used in a gas turbine plant?
- A. Reciprocating compressor
 - B. Screw compressor
 - C. Multistage axial flow compressor
 - D. Either (A) & (B)

Ans. C

62. Which Theory of Failure is represented by the following figure?



- A. Maximum Principal Stress Theory
- B. Maximum Principal Strain Theory
- C. Maximum Shear Stress Theory
- D. Maximum Strain Energy Theory

Ans. C

63. In velocity compounding, steam is passed through _____.
- A. fixed nozzle-moving blades-fixed blades-moving blades
 - B. fixed nozzle-moving blades-fixed nozzles-moving blades
 - C. moving blades-fixed nozzles- fixed blades-moving blades
 - D. fixed blades-moving blades-fixed nozzles- moving blades

Ans. A

64. For minimum work in a reciprocating compressor, the compression process should be _____
- A. adiabatic
 - B. isothermal
 - C. isochoric
 - D. isobar

Ans. B

65. For a four-bar linkage in toggle position, the mechanical advantage is _____.
- A. 0.0
 - B. 0.5
 - C. 1.0
 - D. ∞

Ans. D

66. Octane number of Natural gas is _____.
- A. 110
 - B. 80
 - C. 95
 - D. 40

Ans. A

67. For circular section, ratio of the maximum to the average shear stress is _____.
- A. 1.5
 - B. 1
 - C. 2
 - D. 4/3

Ans. D

68. NPSH is the difference between _____
- A. Suction pressure and vapour pressure
 - B. Vapour pressure and suction pressure
 - C. Suction pressure and heat
 - D. Shaft and head

Ans. A

69. Centrifugal pumps transport fluids by converting _____
- A. Rotational kinetic energy to hydrodynamic energy
 - B. Hydrodynamic energy to kinetic energy
 - C. Mechanical energy to kinetic energy
 - D. Potential energy to Hydrodynamic energy

Ans. A

70. In a reaction turbine, the draft tube is used to _____
- A. To increase the head of water by an amount that is equal to the height of the runner outlet above the tail race
 - B. To prevent air to enter the turbine

- C. To increase pressure energy of water
- D. To transport water to downstream

Ans. A

71. Maximum Number of jets, generally, employed in an impulse turbine without jet interference can be?

- A. 2
- B. 3
- C. 4
- D. 6

Ans. D

72. Among the following which turbine has least efficiency?

- A. Pelton turbine
- B. Kaplan turbine
- C. Francis turbine
- D. Propeller turbine

Ans. A

73. To obtain maximum hydraulic efficiency of pelton turbine, blade velocity should be _____ Times the inlet velocity of jet.

- A. Half
- B. One quarter
- C. Twice
- D. Thrice

Ans. A

74. Flow separation is caused by _____.

- A. Reduction of pressure to vapour pressure
- B. Reduction of pressure gradient to zero
- C. An adverse pressure gradient
- D. The boundary layer thickness reducing to zero

Ans. C

75. Which type of lathe is also known as centre lathe_____?

- A. engine lathe
- B. bench lathe
- C. room lathe
- D. capstan lathe

Ans. A

76. Discontinuous chips are formed during machining of _____.

- A. brittle metals
- B. ductile metals
- C. hard metals
- D. soft metals

Ans. A

77. In the grinding wheel of 60 A 36 G 7 B 23, A stands for _____.

- A. Type of abrasive
- B. Grit Size
- C. Bond type
- D. Structure

Ans. A

78. Which of the following is the type of pendulum governor?

- A. Hartnell governor
- B. Proell governor
- C. Porter governor
- D. Watt governor

Ans. D

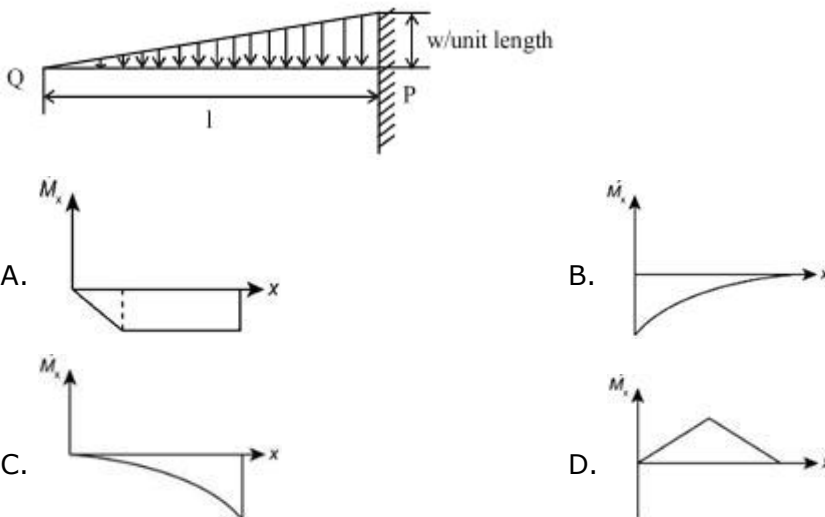
86. In Edge dislocation, Burgers vector is _____.
- Perpendicular to the dislocation line
 - Parallel to dislocation line
 - May be bar or may be parallel depending upon the extent of edge dislocation.
 - None of these

Ans. A

87. The resultant upward pressure of the fluid on an immersed body is called
- total force
 - buoyancy
 - centre of pressure
 - None of these

Ans. B

88. Which of the following is the CORRECT bending moment diagram for the cantilever beam carrying uniformly varying load from zero at free and w /unit length at the fixed end?



Ans. C

89. Scotch-yoke mechanism consist of_____.
- 4 links, 1 Turning pair
 - 4 links, 1 sliding pair
 - 6 links, 4 Turning Pair
 - 4 links, 2 Turning Pair

Ans. D

90. What is the range of efficiency of Rankine cycle in a good steam power station?
- 15% - 20%
 - 35% - 40%
 - 50% - 60%
 - 90% - 95%

Ans. B

91. The instantaneous centre of rotation of a sliding block on a horizontal surface is located at
- The point of contact
 - centre of gravity of sliding block
 - Any point along the line of sliding
 - None of the above

Ans. D

92. If velocity potential function exists in a fluid flow, then_____.
- A. Flow may or may not be rotational
 - B. Flow is always irrotational
 - C. Can't say about rotationality
 - D. Flow is always discontinuous

Ans. B

93. If poissons ratio of a material is 0.15 then, which of the following relations is true?
- A. $E = 1.2K$
 - B. $G = 0.913K$
 - C. $K = 0.838G$
 - D. $E = 3.20G$

Ans. B

94. The state of stress during deep drawing forming operation of a cup is
- A. In the flange of blank, uni-axial compression and in wall of cup, bi-axial tension and compression
 - B. In the flange of the blank, uni-axial tension and in wall of cup, bi-axial tension and compression
 - C. In the flange of the blank, bi-axial tension and compression and in the wall of cup, simple uni-axial tension
 - D. Both flange and wall of the cup will have bi-axial compression and tension

Ans. C

95. The equation of motion of a spring-mass-damper system is given by $\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 9x = 10\sin(5t)$. The damping factor for the system is
- A. 0.5
 - B. 2
 - C. 0.25
 - D. 3

Ans. A

96. A liquid flow through a horizontal circular pipe of 2 cm diameter at 4 m/s under laminar condition. The pressure drop across the pipe was observed to be 5 kPa. The Pumping power (in W) required to maintain the flow is given by _____.
- A. $\frac{\pi}{2}$
 - B. π
 - C. 2π
 - D. 4π

Ans. C

97. When liquid passes through the divergent portion of venturi-meter then pressure of liquid _____.
- A. Increases
 - B. Decreases
 - C. Constant
 - D. Can't determined

Ans. A

98. A Rolling process is done using two roller of diameter 400 mm. The coefficient of friction is 0.3. The maximum draft possible (in mm) is
- A. 8
 - B. 4
 - C. 18
 - D. 14

Ans. C

99. The operation in a lathe used for producing a serrated surface is known as _____.
- A. Facing
B. Parting
C. Knurling
D. Laping

Ans. C

100. A cantilever beam of length L is loaded as shown in the figure below. What is the total deflection at point B?



- A. $\frac{wL^4}{8EI} + \frac{PL^3}{3EI}$
B. $\frac{wL^3}{8EI} - \frac{PL^3}{3EI}$
C. $\frac{wL^4}{8EI} - \frac{PL^3}{3EI}$
D. $\frac{wL^4}{48EI} + \frac{PL^3}{3EI}$

Ans. C

101. The enthalpies at various points in a VCRS cycle are given below.

Inlet to compressor: 100 kJ/kg

Inlet to evaporator: 60 kJ/kg

Exit of compressor: 120 kJ/kg

Calculate the Cop of this cycle.

- A. 0.5
B. 1
C. 2
D. 1.5

Ans. C

102. The velocity component in the x and y direction are given by $u = p \cdot xy^2 - x^2y$ and $v = xy^2 - \frac{2}{3}y^3$. The value of p for a possible flow field involving an incompressible fluid is _____.

- A. 2
B. 1
C. 3
D. -1

Ans. A

103. For a root blower which of the following statement is incorrect_____?

- A. It has two rotor arranged in parallel axis.
B. Both rotor rotate opposite to each other.
C. Lobes of the rotor are of involute profile.
D. None of the above.

Ans. D

104. Which of the following statement is incorrect about reaction steam turbine_____?

- A. Pressure drop takes place in moving blade only.
B. Blade cross section passage is converging type.

- C. All round admission of steam through blade.
- D. More efficient compared to impulse steam turbine.

Ans. A

105. What is the kinetic energy of the flywheel after 10 sec, if its mass = 400 kg. radius of gyration = 200 mm and is subjected to a constant torque of 600 N-m.
- A. 524.8 kJ
 - B. 586.3 kJ
 - C. 642.86 kJ
 - D. 626.27 kJ

Ans. C

106. Viscosity of a fluid is function of _____.
- A. cohesion force only
 - B. Molecular momentum transfer only
 - C. Both Adhesion and molecular momentum transfer
 - D. Both cohesion and molecular momentum transfer

Ans. D

107. As per the ASA tool signature, the fourth tool angle is _____.
- A. Side rake angle
 - B. Side relief angle
 - C. End cutting edge angle
 - D. Side cutting edge angle

Ans. B

108. Which of the following are the advantages of solid fuel injection systems:
- 1) Simple in construction.
 - 2) Lighter in weight.
 - 3) Lower fuel consumption.
 - 4) Lower initial cost.
- A. 1, 2 and 3 only
 - B. 2, 3 and 4 only
 - C. 3 and 4 only
 - D. 1, 2, 3 and 4

Ans. D

109. If the efficiency of an air washer 93% and actual drop in DBT is 25°C, then the difference between ideal drop in DBT and actual drop in DBT is _____ ?
- A. 1.9°C
 - B. 1.7°C
 - C. 2°C
 - D. 1.5°C

Ans. A

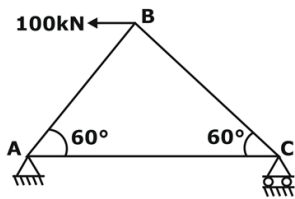
110. The vapour pressure of air at a dry bulb temperature of 27°C is 340 Pa. The atmospheric pressure is 100 KPa. Find the specific humidity.
- A. 2.12 g vap./kg da
 - B. 2.5 kg vap./kg d.a.
 - C. 3.12 g vap./kg da
 - D. 2.12 kg vap./kg d.a.

Ans. A

111. Consider the following statements:
- 1. The BPF of coil increase as the velocity of air through the coil increases.
 - 2. The BPF of coil decreases as the number of rows in flow direction increases.

Ans. A

118. A plane truss ABC is shown in the figure.



The force in the member AB and BC respectively are _____.

- A. 100 kN (Tension) & 100 kN (compression)
- B. 100 kN (Compression) & 100 kN (Tension)
- C. $100\sqrt{2}$ kN (Tension) & 100 kN (Compression)
- D. 100 kN (Tension) & $100\sqrt{2}$ kN (Compression)

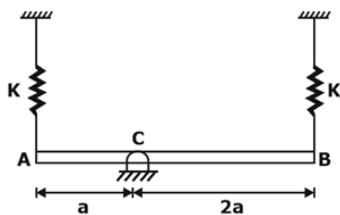
Ans. B

119. In a non-inertial frame of reference, a body is

- A. accelerated
- B. decelerated
- C. moves with uniform velocity
- D. either accelerated or decelerated

Ans. D

120. A rigid uniform rod AB of mass m and length $3a$ is hinged at C as shown in the figure. It is supported by springs of springs constant K at the ends. Natural frequency of the system is given by



- A. $\sqrt{\frac{K}{2m}}$ rad/s
- B. $\sqrt{\frac{K}{m}}$ rad/s
- C. $\sqrt{\frac{2K}{m}}$ rad/s
- D. $\sqrt{\frac{5K}{m}}$ rad/s

Ans. D
