MEGA MOCK CHALLENGE

gradeup

SSC JE 2019-20

Mechanical Engineering

Mini Mock Challenge
(July 15- July 16 2020)

Questions & Solutions

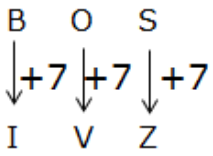
1. **In the following question, select the related group of letters from the given alternatives.**

BOS : IVZ :: DOG : ?

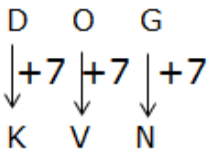
A. MTV
B. KVN
C. KBC
D. RBC

Ans. B

Sol. As,



Similarly,



Thus, BOS: IVZ :: DOG: KVN

Hence, option B is the correct answer.

2. **In the following question, select the related number from the given alternatives.**

15 : 45 :: 25: ?

A. 100
B. 225
C. 125
D. 135

Ans. C

Sol. $15^2/5=225/5=45$

In the same way,

$25^2/5=625/5=125$

Thus, 15 : 45 :: 25: 125

Hence, option C is the correct answer.

3. **In the following question, select the odd number from the given alternatives.**

A. 118
B. 424
C. 262
D. 238

Ans. D

Sol. 118 = 1 + 1 + 8 = 10

424 = 4 + 2 + 4 = 10

262 = 2 + 6 + 2 = 10

238 = 2 + 3 + 8 = 13

Hence, option D is the correct answer.

4. Three of the following four words are alike in a certain way and one is different. Pick the odd one.

A. Yuan
B. Lira
C. Cuba
D. Baht

Ans. C

Sol. Except for Cuba, all other are the name of currencies of different countries while Cube is the name of the country.

Yuan - Currency of China

Lira - Currency of Turkey

Baht - Currency of Thailand

Hence, option C is the correct response.

5. **Select the correct alternative to indicate the arrangement of the following words in a logical and meaningful order.**

1) Result
2) Scholarship
3) Students
4) Admission
5) Test

A. 3,5,1,2,4
B. 3,4,1,2,5
C. 1,5,3,2,4
D. 3,5,4,2,1

Ans. A

Sol. Correct order to get scholarship for admission in higher education is-

3. Students
5. Test
1. Result
2. Scholarship
4. Admission

Correct order is- 3,5,1,2,4

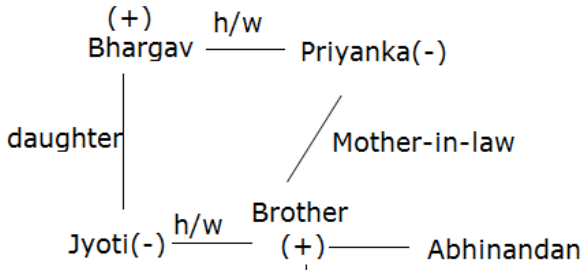
Hence, option A is the correct answer.

6. Abhinandan said, his brother is married to Jyoti who is the daughter of Bhargav who is the husband of Priyanka. How's the Priyanka related to Abhinandan's brother?

A. Aunt
B. Mother
C. Mother-in-law
D. Sister

Ans. C

Sol.



From the above figure, Its very easy to conclude that Priyanka is the mother-in-law of Abhinandan's brother.

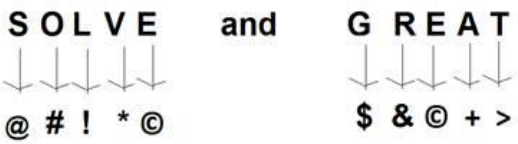
Hence, option C is the correct answer.

7. If the code for **SOLVE** is " **@ #!* ©**" and **GREAT** is coded as "**$& ©+>**", then what is the code for "**VATS GO LATE**" in the same code language?

A. (+> @ *# !+$ ©
B. *+% @ $# !<> ©
C. *+>$ &# !%> ©
D. *+> @ $# !+> ©

Ans. D

Sol. The trend is:



Each alphabet is coded as a special symbol, as indicated above.

Therefore, the code for "VATS GO LATE" in the same code language will be "*+> @ $# !+> ©".

Hence, option D is the correct answer.

8. **In the following question, select the missing number from the given alternatives.**

63	88	56
54	32	44
81	?	88

A. 80
B. 85
C. 90
D. 95

Ans. A

Sol. 1st Column:

(6+3)*(5+4)=9*9=81

3rd Column:

(5+6)*(4+4)=11*8=88

Similarly,

2nd Column:

(8+8)*(3+2)=16*5=80

Hence, option A is the correct answer.

9. **Two statements are given, followed by three conclusions numbered I, II and III. Assuming the statements to be true, even if they seem to be at variance with commonly known facts, decide which of the conclusions logically follow(s) from the statements.**

Statements :

Some children are clever

All children are honest

Conclusions :

I. Some clever are children

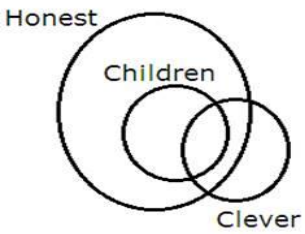
II. Some honest are children

III. Some clever are honest

A. Either conclusion I or III follows
B. Only conclusions I and II follow
C. Only conclusions II and III follow
D. All conclusions follow

Ans. D

Sol. Minimum Possible diagram is-



Conclusions :

I. Some clever are children.(It follows as its obvious from the above diagram.)

II. Some honest are children.(It also follows as its obvious from the above diagram.)

So, All conclusions follow.

Hence, option D is the correct answer.

10. **Select the correct mirror image of the given figure when the mirror is placed to the right of the figure.**

A. 

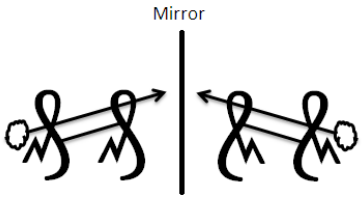
B. 

C. 

D. 

Ans. C

Sol. In a plane mirror, a mirror image is a reflected duplication of an object that appears almost identical, but it is reversed in the direction perpendicular to the mirror surface. As an optical effect it results from reflection of substances such as a mirror or water.



Hence, option C is the correct answer.

11. Which incident is considered as the first hunger strike of Mahatma Gandhi in India?

A. Camparan Satyagrah
B. Ahmedabad Mill Strike
C. Kheda Satyagrah
D. Rawlatt Satyagrah

Ans. B

Sol. Ahmedabad Mill Strike is considered as the **first hunger strike of Mahatma Gandhi** in India.

- Mahatma Gandhi sat on fast unto death to meet the demands of raising bonus of mill workers upto 35 percentage.
- **Anusuya Sarabhai** associated with gandhiji in this mill strike.
- Anusuya Sarabhai later formed the **Ahmedabad Textile Labour Association** in 1920.
- Ultimately the hunger strike of gandhiji was called off when the owners agreed on allocation of 35 percentage bonus to workers.

12. The non-cooperation movement was a reaction towards which incidents caused by Britisher's oppressive rule?

A. Rowlatt Act
B. Jallianwala Bagh massacre
C. Simon Commission
D. Both A and B

Ans. D

Sol. The non-cooperation movement was a reaction towards the oppressive policies of the British Indian government such as the **Rowlatt Act and the Jallianwala Bagh massacre in Amritsar.**

- The Non-cooperation movement was launched on 1st August 1920 by Mahatma Gandhi.

13. Whose presided the 1929 session of congress?

A. Gandhi Ji
B. Jawahar Lal Nehru
C. Sardar Patel
D. Sarojini Naidu

Ans. B

Sol. * The **1929 Session of Indian National Congress was presided by Jawahar Lal Nehru** at Lahore.

* In this session he put forward the demand of Poorna Swaraj and asked the people of India to observe 26th of January as Independence Day.

* The flag of India was hoisted publicly across India by Congress volunteers, nationalists and the public.

* This session is a landmark in the history of Indian National Movement.

14. The doctrine of basic structure of constitution was given in which case?

A. Golak Nath case
B. Keshwanand bharti case
C. Minerva mills case
D. Indira Sahani case

Ans. B

Sol. The doctrine of basic structure of constitution was given in **Keshwanand bharti case**, 1973.

* In this case, The Supreme Court held that the Parliament has power to amend any provision of the constitution, but doing so, the basic structure of the constitution is to be maintained.

* The basic features of the Constitution include:

Supremacy of the constitution, Republican and democratic form of government, Secular character of the constitution, Federal character of the constitution, Separation of power etc.

15. Which part of the Indian Constitution is related to the Elections?

A. Part XX
B. Part X
C. Part XII
D. Part XV

Ans. D

Sol. • **Article 324 to 329 in Part XV** of the Constitution contains the provisions with regard to the electoral system in India.

• Elections in India have been the largest electoral exercise in the world since the 1st general elections of 1952.

• Article 324 provides for an independent Election Commission in order to ensure free and fair elections in the country.

16. What is the coastal part of Maharashtra called?

A. Coromandel Coast
B. Malabar Coast
C. Kanara Coast
D. Konkan Coast

Ans. D

Sol. • The coastal part of Maharashtra is called Konkan Coast.
• Parts of Andhra coast and coast of Tamil Nadu together are known as Coromandel Coast.
• The coastal area of Kerala is known as Malabar Coast.
• The coastal area of Karnataka is known as Kanara Coast.

17. MIKE Programme is related to the conservation of?

A. Mouse
B. Kite
C. Elephant
D. Musk Deer

Ans. C

Sol. • MIKE stands for **Monitoring of Illegal killing of Elephants program.**
• The MIKE Programme was established by CITES by Resolution 10.10 adopted at the tenth Conference of the Parties in 1997.
• The Ministry of Environment and forests in partnership with Wildlife Trust of India has launched a campaign **Hathi Mere Sathi**.
• India has 10 sites listed under this programme while there are currently 28 sites in MIKE programme in Asia.
• The list of 10 MIKE sites in India is as follow-
⇒ **Chirang-Ripu Elephant Reserve, Deomali Elephant Reserve, Dihing Patkai Elephant Reserve, Garo Hills Elephant Reserve, Eastern Dooars Elephant Reserve, Mayurbhanj Elephant Reserve, Shivalik Elephant Reserve, Mysore Elephant Reserve, Nilgiri Elephant Reserve and Wayanad Elephant Reserve**.

18. What is the colour of the light emitted by the Sun?

A. Red
B. Yellow
C. White
D. Orange

Ans. C

Sol. • White colour light is emitted by the sun.
• It is a composite of all the visible frequencies of light.
• Sunlight can be broken into the full spectrum of its colors: red, orange, yellow, **green**, blue, indigo and violet .

19. What is Gotabaya Rajapaksa's nationality?

A. Bangladeshi
B. Sri Lankan
C. Indonesian
D. Burmese

Ans. B

Sol. • Gotabaya Rajapaksa is a Sri Lankan politician, technocrat, and military officer, who is the current President of Sri Lanka.
• He served as Secretary to the Ministry of Defence and Urban Development from 2005 to 2015 under the administration of his elder brother former President Mahinda Rajapaksa.

20. The earliest book on mathematics Sulvasutra was written by whom?

A. Aryabhatta
B. Apastamba
C. Baudhayana
D. Brahamgupta

Ans. C

Sol. * The earliest book on mathematics was **Sulvasutra written by Baudhayana** in the 6th century BC.

* There is a mention of '**Pi'** and even some concepts very similar to **Pythagoras theorem in the Sulvasutra.**

* **Apastamba** introduced the concept of practical geometry involving acute angles, obtuse angles and right angles.

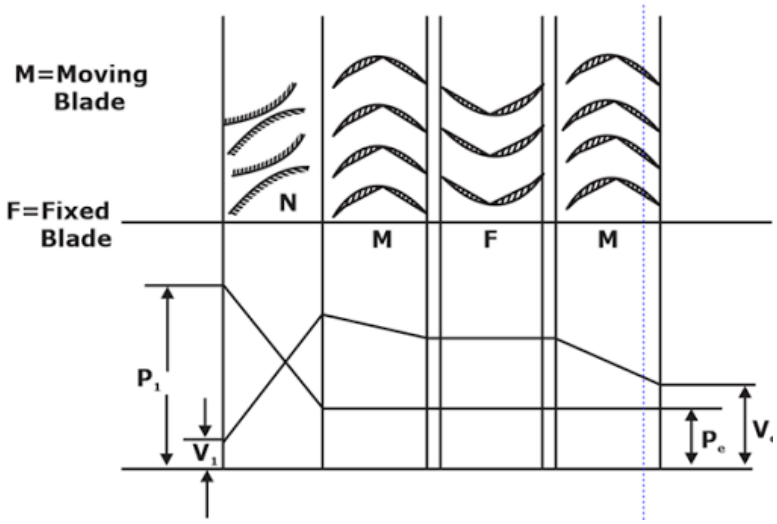
* **Aryabhatta** in around 499 AD wrote **Aryabhattiya** in which the concepts of mathematics as well as astronomy were mentioned.

21. In the velocity compounding of an impulse turbine _____.

A. All pressure drop is in single row of nozzle.
B. Pressure drop is in rows of alternative nozzles.
C. Pressure drop is in both fixed and moving blades.
D. Pressure remains constant in nozzle.

Ans. A

Sol. In the velocity compounding of the impulse turbine , all pressure drop and enthalpy drop of steam takes place in a single row of nozzle.



22. Compression ratio of diesel engine varies from ___.

A. 6 to 10
B. 10 to 15
C. 16 to 20
D. 25 to 40

Ans. C

Sol. Diesel engine compression ratio is high and it varies from 16 to 20.Due to high compression ratio the diesel engine are bulky than the petrol engine which have less compression engine.

23. If the contact ratio is 2.7, two pairs of teeth are always in contact and three pairs of teeth are in contact for _____ % of the time.

A. 100 B. 50

C. 45 D. 70

Ans. D

Sol. If the contact ratio is 2.7, two pairs of teeth are always in contact and three pairs of teeth are in contact for 70 % of the time.

24. Which of the following is correct about a dead state ?

A. System is in equilibrium with its surroundings

B. System has zero exergy

C. both of the above

D. none of the above

Ans. C

Sol. Dead state of a thermodynamic system is the state when a system is in equilibrium to its surroundings, which means that the availability of the system is zero.No useful work can be obtained from a system which is in dead state.

25. Which of the following correctly defines torsional rigidity?

A. Product of polar moment of inertia and modulus of rigidity

B. Torque per unit twist

C. Torque at which shear stress is maximum

D. Product of modulus of elasticity and moment of inertia

Ans. A

Sol. Torsional Rigidity is defined as the product of the polar moment of inertia and modulus of rigidity.

Torsional rigidity = GJ

Unit = $N\text{-}m^2$

26. For machining of carbide material which of the following tool will be preferred?

A. Large positive rake angle tools

B. Large negative rake angle tools

C. Zero rake angle tools

D. Small point angle tools

Ans. B

Sol. Carbide materials are very hard hence strong tool is required for their machining. Tools with large negative back rake angle are stronger.

27. Which of the following theory is better to use for safe design of new clutches?

A. Uniform pressure theory
B. Uniform wear theory
C. Uniform velocity theory
D. Any of them can be used

Ans. A

Sol. Uniform pressure theory is used for safe design of new clutches, while Uniform wear theory is being used for the older ones.

28. 10 m of water column is equal to _____ KPa ($g = 10\ m/s^2$)

A. 100
B. 10
C. 1
D. 1000

Ans. A

Sol. Given

Height of the water column (h)=10 m

Density of water is (ρ)=1000 kg/m^3

The pressure equivalent to column of water is given as

$P = \rho gh = 1000 \times 10 \times 10 = 100\ kN/m^2 = 100$ KPa

29. Which of the following device are used for throttling of the fluid?

A. Partially opened valve
B. Orifice
C. Porous plug
D. all of the mentioned

Ans. D

Sol. In all of the given cases, there is an appreciable drop in pressure and enthalpy is constant.The examples of the throttling process are

Flow through a partially opened valve

Flow through a very small opening (orifice)

Flow through a porous plug

30. As compared to a streamlined body, a bluff body will have _____.

A. More pressure drag but less friction drag.
B. More pressure drag and more friction drag.
C. Less pressure drag and less friction drag.
D. Less pressure drag but more friction drag.

Ans. A

Sol. A Bluff body is defined as that body whose surface does not coincide with the streamlines, when placed in a flow.Then the flow is separated from the surface of the body much ahead of its trailing edge with the result of a very large wake formation zone. Then the drag due to pressure will be very large as compared to the drag due to friction on body.

31. Which of the following fluids are used in Electrolux refrigerator?

A. Water and hydrogen
B. Ammonia and hydrogen
C. Ammonia, water and hydrogen
D. None of these

Ans. C

Sol. The main purpose of domestic electrolux refrigerator is eliminating the pump so that in the absence of moving parts, the machine becomes noise less. This type of refrigerators is also called three fluid absorption systems. The three fluid used in this system are ammonia, hydrogen and water.Hydrogen gas increases the rate of evaporation of liquid ammonia passing through the evaporator.

32. A furnace is mode of material whose wall of thickness 0.2 m and Conductivity 0.4 W/mk. What is the thickness if it is replaced by a layer of another material of conductivity 0.8 W/mk under the same heat loss per unit area and same temperature drop ?

A. 0.2 m
B. 0.4 m
C. 0.1 m
D. 1m

Ans. B

Sol. Given,

Initial Thickness = 0.2 m,

Conductivity = 0.4 W/mk,

$$\frac{Q}{A} = k\frac{dT}{dx}$$

For same heat loss per unit area and same temperature drop

$$dx_2 = \frac{k_2 dx_1}{k_1} = \frac{0.8 \times 0.2}{0.4} = 0.4 \text{ m}$$

33. Which of the following casting defect is due to less fluidity of molten metal?

A. Cold shut
B. Scab
C. Hot tear
D. Swell

Ans. A

Sol. When two streams of molten metal are not able to fuse together , then the defect appeared is known as cold shut.Hence this defect is due to less fluidity of metal.This defect is removed by providing a superheat to molten metal before pouring.

34. Which of the following fluid has shear stress directly proportional to the rate of shear strain?

A. Water
B. Printer ink
C. Butter
D. Bentonite solutiuon

Ans. A

Sol. Water is newtonian fluid and in newtonian fluid shear stress is directly proportional to the rate of shear strain.

Butter is dilatent fluid.

Bentonite solution is rheopectic fluid.

Printer ink is a thixotropic fluid.

35. 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

Sol. Hydraulic intensifier is machine for increasing the intensity of pressure by utilizing the energy of a large quantity of water available at low pressure.

Such a device is needed when the hydraulic machines such as hydraulic press requires water at very pressure which cannot be obtained from main supply directly.

36. Proof resilience is defined as _____.

A. Maximum strain energy stored at elastic limit
B. Maximum strain energy stored at proportional limit
C. Maximum strain energy stored upto failure
D. Maximum strain energy upto tenacity

Ans. A

Sol. Resilience is defined as the strain energy stored in the body within elastic limit.

Proof resilience is defined as the maximum strain energy that can be stored in the body upto elastic limit.It is also the area of the load vs deformation curve upto elastic limit.

Modulus of resilience is defined as the proof resilience per unit volume.

Toughness is defined as the strain energy stored in the body upto fracture .

37. The amount of heat required to raise temperature of a substance by $1^{o}C$ is called as ___.

A. Work capacity
B. Heat capacity
C. Energy capacity
D. None of the above

Ans. B

Sol. The amount of heat required to raise the temperature of a substance by $1^{o}C$ is called as heat capacity.

$Q = C \Delta T$

$$C = \frac{Q}{\Delta T}$$

Hence for unit raise in temperature ($\Delta T = 1$), $Q = C$

38. Which of the following expression relates the degree of freedom (F), number of phases (P) , number of components (C) for a pure substance ?

A. P+F = C+2
B. P+F = C-2
C. P+F = C+1
D. P+F = C-1

Ans. A

Sol. According to Gibbs Phase rule,

P+F = C+N, where N is no. of independent parameters that can be varied.

In thermodynamics, N = 2 for pressure and temperature.

So, P+F = C+2

39. A floating mandrel is used in _____.

A. Wired drawing
B. Tube drawing
C. Metal Cutting
D. Forging

Ans. B

Sol. Tube drawing is a process to size a tube by shrinking a large diameter tube into a smaller one by drawing the tube through a die.

There are multiple arrangement of mandrel used for tube drawing.In fixed mandrel tube drawing , a fixed mandrel is used at the end of die to shape the inner diameter of tube.But high friction is present is present in fixed mandrel and handling is difficult.Floating mandrel is not fixed rather the mandrel is held in by friction force between the mandrel and the tube.

40. The velocity direction at a point in a fluid flow is ___.

A. Normal to streamline
B. Tangent to the streamline
C. Tangent to streakline
D. Tangent to the pathline

Ans. B

Sol. A streamline is an imaginary line drawn in a flow field such that a tangent drawn at any point on this represents the direction of velocity vector at that point.

There is no velocity component normal to stream lines.

A pathline is curve traced by a single fluid particle during its motion.

When a dye is injected in a liquid or smoke in a gas so as to trace the subsequent motion of fluid particles passing a fixed point point, the path followed by the dye or smoke is called streakline.

41. The damping ratio of a single degree of freedom spring-mass damper system with mass 2 kg and stiffness 50N/m and viscous damping coefficient of 7 Ns/m is_____.

A. 0.2
B. 0.03
C. 0.35
D. 0.035

Ans. C

Sol. Given,

Mass = 2 kg ,

Stiffness =50N/m,

Viscous damping coefficient = 7 Ns/m

Damping ratio,

$$\xi = \frac{C}{2\times\sqrt{km}}$$

$$= \frac{7}{2\times\sqrt{2\times 50}}$$

$$= 0.35$$

42. Perpetual Motion machine of second kind violates the _____.

A. First law of Thermodynamics
B. Kelvin- Planck statement
C. Clausius statement
D. Third law of Thermodynamics

Ans. B

Sol. PMM-II is the machine which does work with interacting with only one thermal energy reservoir.In other words the thermal efficiency is 100 %.

According to Kelvin-Planck statement , it is impossible for any device that operates on a cycle to receive heat from a single reservoir and produce a net amount of work.Hence PMM-II violates the Kelvin-Planck statement.

43. In the subsonic flow through a convergent nozzle , the velocity _____.

A. Decreases
B. First increase then decrease
C. Increases
D. Reamins same.

Ans. C

Sol. The expression relating the area , mach number and the velocity in nozzle is given below.

$$\frac{\partial A}{A} = \frac{\partial V}{V}\left(1 - M^2\right)$$

We see that M<1,an area change causes a velocity change of opposite sign,hence decrease in area increases the velocity of flow.

44. Theoretical concentration factor (K_t) for circular hole is_____.

A. 1
B. 2
C. 3
D. 4

Ans. C

Sol. As we know that,

$$k_t = 1 + 2\left(\frac{\text{Length of semi - axis of hole perpendicular of direct of loading}}{\text{Length of semi - axis of hole parallel to the direction of loading}}\right)$$

$$k_t = 1 + 2\left(\frac{a}{b}\right)$$

For circular hole, a=b, then $k_t = 3$

45. An enclosure consists of four surfaces 1, 2, 3 and 4. The view factors for radiation heat transfers are

$F_{11} = 0.1$

$F_{12} = 0.4$

$F_{13} = 0.25$

The surface areas A_1 and A4 are 4 m^2 and 2 m^2. The view factor F_{41} is

A. 0.50
B. 0.75
C. 0.1
D. 0.25

Ans. A

Sol. Given,

$F_{11} = 0.1$

$F_{12} = 0.4$

$F_{13} = 0.25$

By summation rule,

$F_{11} + F_{12} + F_{13} + F_{14} = 1$

$0.1+0.4+0.25+ F_{14} = 1$

$F_{14} = 0.25$

Reciprocity relation,

$A_1F_{14} = A_4F_{41}$

$4 \times 0.25 = 2 \times F_{41}$

$F_{41} = 0.5$

46. In a FCC structure, the total number of atoms in a unit cell is

A. 1 B. 4

C. 2 D. 3

Ans. B

Sol. An FCC cube has one atom at each corner and one atom at the intersection of the diagonals of each of the six faces of the cube. In this case there are 8 atoms, one at each corner of the cube plus 6 face centered atoms at the 6 planes of the cube.

$$\text{Total atoms in FCC unit cell} = \frac{1}{8} \times 8 + \frac{1}{2} \times 6$$

= 1 + 3 = 4 atoms

47. Which of the following refrigerant is designated by R731 ?

A. Water B. Ammonia

C. CFC D. Carbon dioxide

Ans. B

Sol. For inorganic compounds the designation of refrigerants is given by

R (700 + molecular weight).

For ammonia (NH_3) , the molecular weight is 31.

Hence the designation is R731

48. The distance travelled by a body in first 5 seconds from its initial position, if velocity(v) time relation is given as v = 4t _____.

A. 20 m B. 25 m

C. 35 m D. 50 m

Ans. D

Sol. Given,

v = 4t

$$\Rightarrow \frac{dS}{dt} = 4t$$

$$\int_0^S dS = \int_0^5 4t\, dt$$

$$S = \left[\frac{4t^2}{2}\right]_0^5 = 50 \text{ m}$$

49. The critical path of a network represents_____.

A. The maximum time required for completion of project

B. The minimum time required for completion of project

C. Maximum cost required for completion of project

D. Minimum cost required for completion of project

Ans. B

Sol. The critical path of a network represents the minimum time required for completion of project.But this is the longest path in the network.

50. 100 MPa (Tensile) and 50 MPa (Compressive) are the principle stress acting at point on the component. The maximum shear stress τ_{max} (in MPa) is _____.

A. 25 B. 150

C. 75 D. 50

Ans. C

Sol. Given

σ_1=100 MPa

σ_1=-50 MPa

The maximum shear stress is given by

$$\tau_{max} = \frac{\sigma_1 - \sigma_2}{2}$$

$$\tau_{max} = \frac{100 - (-50)}{2} = 75 \text{ MPa}$$

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Upcoming Mini Mock Challenge in July Month

SSC JE

Mechanical Engineering

Exam	Live Date	Syllabus	No. of Questions	Time
SSC JE Mini Mock Test-1	08 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-2	15 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-3	22 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30
SSC JE Mini Mock Test-4	29 July 2020	Full Syllabus (Tech. (30 Q's) & Non-Tech. (20 Q's))	50	30

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