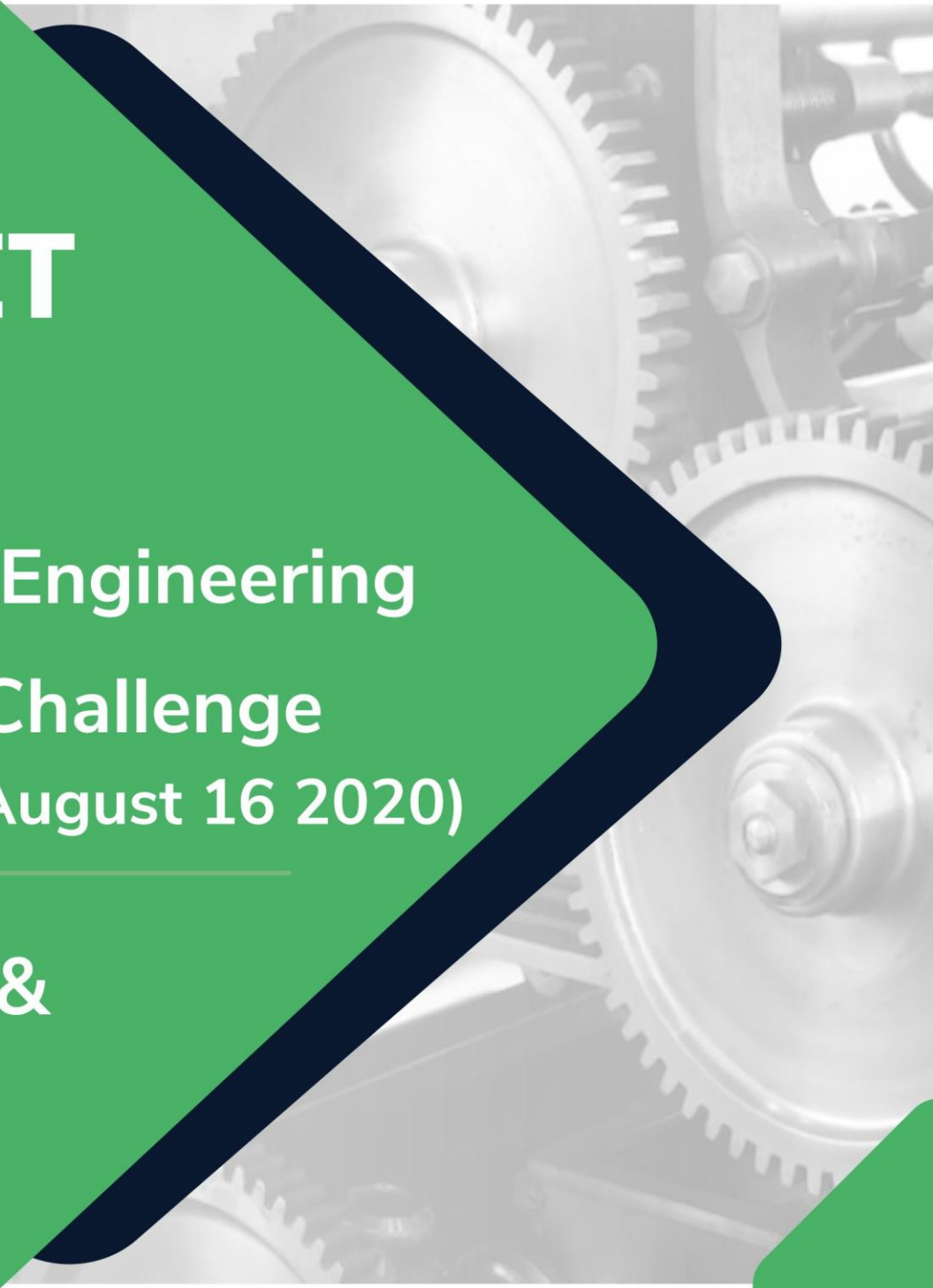
MEGA MOCK CHALLENGE

gradeup



# NLC GET 2020

## Mechanical Engineering

## Mini Mock Challenge

(August 15- August 16 2020)

## Questions & Solutions

1. When a number is increased by 120, it becomes 130% of itself. What is the number?

A. 400 B. 520

C. 460 D. 580

Ans. A

Sol. Let the number be x

Then x+120=130%of x

$$x + 120 = \frac{130}{100} \times x$$

120 = 1.3x – x

0.3x = 120

x = 400

2. The HCF of two numbers is 15 and their LCM is 225. If one of the numbers is 75, then the other is:

A. 105 B. 90

C. 60 D. 45

Ans. D

Sol. First number × Second number = HCF × LCM

75 ×Second number = 15 × 225

$$\therefore \text{Second number} = \frac{15 \times 225}{75} = 45$$

3. If 25 is added to a number it becomes 3 less than thrice of the number. Then number is:

A. 15 B. 14

C. 19 D. 20

Ans. B

Sol. Let the number be x,

According to the question,

$x + 25 = 3x - 3$

$\Rightarrow 3x - x = 25 + 3$

$\Rightarrow 2x = 28$

$\Rightarrow x = 14$

4. Find the square root of 2401?

A. 49 B. 41

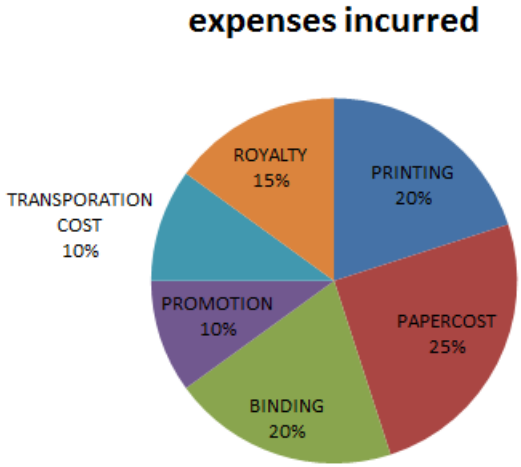
C. 51 D. 71

Ans. A

Sol. 2401 = 7 × 7 × 7 × 7

$$\sqrt{2401} = \sqrt{7 \times 7 \times 7 \times 7} = 7 \times 7 = 49$$

5. The following pie chart shows the percentage distribution of the expenses incurred by a publishing house. Study the pie chart and answer the following questions:




Royalty is less than printing cost by how much percent?

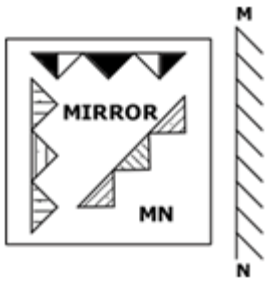
A. 5%
B. 33.33%
C. 20%
D. 25%

Ans. D

Sol. Percent Difference = 20% - 15% = 5%

We have to find out the percent difference with respect to printing cost. Hence, required percentage = (5/20)*100% = 25%

6. Which of the following options will give the mirror image of the given figure when a mirror is placed along MN?




A. 

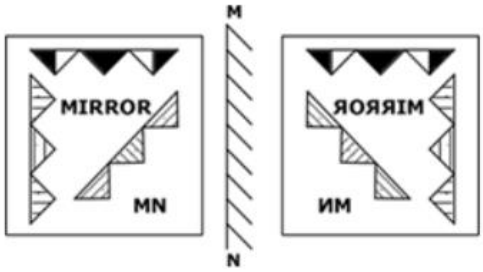
B. 

C. 


D. 

Ans. D

Sol. On observing the options we can see that the figure given under option (D) is the appropriate answer.




Hence, option D is correct.

7. In a certain language, 'sdr ngt olp' means 'Going to Patna', 'olp swq' means 'Going there' and 'yyt swq jht' means 'There was Golghar'. What is the code for 'there' in that language?

A. olp B. swq

C. yyt D. ngt

Ans. B

Sol. 'sdr ngt olp' = 'Going to Patna'_____(1)

'olp swq' = 'Going there' _____(2)

'yyt swq jht' = 'There was Golghar'_____(3)

From 1 and 2, 'Going' = olp.

Therefore, 'there' = swq

Hence, option (B) is the correct response.

8. A series is given with one term missing. Select the correct alternative from the given ones that will complete the series.

7, 10, 15, 24, 41, 74, ?

A. 149 B. 169

C. 159 D. 139

Ans. D

Sol. Logic:

$2^1+5=7$

$2^2+6=10$

$2^3+7=15$

$2^4+8=24$

$2^5+9=41$

$2^6+10=74$

**$2^7+11=139$**

So, Missing Number=139

Hence, option D is the correct response.

9. If 'M' means '×', 'K' means '÷', 'G' means '+', and 'P' means '–', then what is the value of
34 P 12 M 5 G 20 K 4 M 2 P 3

A. 62 B. -19

C. 29 D. 41

Ans. B

Sol.

| Symbols | M | K | G | P |
|---|---|---|---|---|
| Codes | × | ÷ | + | – |

34 P 12 M 5 G 20 K 4 M 2 P 3

⇒ 34 – 12 × 5 + 20 ÷ 4 × 2 – 3

⇒ 34 – (12 × 5 )+ (20 ÷ 4) × 2 – 3

⇒ 34 – 60 + (5× 2) – 3

⇒ 34 – 60 + 10 – 3

⇒ 34-50-3

⇒ – 19

Hence, option B is the correct response.

10. In the following question, select the odd word from the given alternatives.

A. Kufri B. Nainital

C. Dehradun D. Ranikhet

Ans. A

Sol. All except 'Kufri', all others are in Uttarakhand while 'Kufri' is in Himachal Pradesh.
Hence, the correct option is A.

11. Gandhiji was highly influenced by the book 'Unto the last'. Who was the author of this book?

A. Tolstoy B. John Ruskin

C. Louis Fischer D. Blavatsky

Ans. B

Sol. • **John Ruskin** was the author of the book '**Unto the Last'**.

• Some other **major works of Ruskin are**- Modern painters, The Seven Lamps of Architecture, Stones of Venice etc.

• Many founding fathers of Labour party in India were also influenced by this book.

12. White blood cells are also known as _____.

A. Erythrocyte B. Leukocytes

C. Thrombocytes D. None of these

Ans. B

Sol. * **White blood cells are also known as Leukocytes**.

* They help from protecting against diseases.

* The normal white cell count is usually between $4 \times 10^9$/L and $1.1 \times 10^{10}$/L.

* Decrease in the White Blood cells is called Leukopenia.

13. Knot is a unit of which of the following quantity?

A. Distance B. Velocity

C. Force D. Torque

Ans. B

Sol. **Knot** is a unit of speed which is equal to nautical mile per hour.

• The knot is a non-SI unit.

• The ISO standard symbol for the knot is **kn.**

• Nautical miles and knots are convenient units to use when navigating an aircraft or ship.

14. Coimbatore is famous for which of the following industries?

A. Textile industry B. Leather industry

C. Chemical industry D. None of these

Ans. A

Sol. • **Coimbatore** is also known as **Kovai and Koyamuthur**.

• It is a major city in the Indian state of Tamil Nadu.

• This city is famous for textile industry.

• Coimbatore is called the "**Manchester of South India**" due to its extensive textile industry.

15. Which among the following is the longest river of Peninsular India?

A. Narmada B. Krishna

C. Godavari D. Luni

Ans. C

Sol. • **Godavari is the longest river of Peninsular India** and 2nd longest river of India.

• This river is also known as Dakshin Ganga.

• It originates in Western Ghats of central India near Trimbak in Nashik District in Maharashtra.

16. Given below are four jumbled sentences. Pick the option that gives their correct order.

P: Shardul was waiting for his school bus.

Q: As a leader of the house, he wanted to win the General Championship by scoring maximum points.

R: It was 7 o' clock in the morning.

S: He was keenly looking at the approaching vehicles.

A. PRSQ B. SRPQ

C. RSPQ D. RPSQ

Ans. D

Sol. R is an introductory sentence as it starts with the time- 7 O' clock in the morning. Sentence P points out that he is waiting for his school bus. Sentence S focuses on how keenly he is looking at the vehicle approaching him. The only option with sequence RPS is **option D**. Hence, it is the answer.

17. Select the most appropriate synonym of the given word.

CURSORY

A. little
B. quick
C. eager
D. tender

Ans. B

Sol. CURSORY means done quickly with little attention to detail.
Eager means strongly wanting to do or have something.
Tender means showing gentleness, kindness, and affection.
Hence, option B is the correct answer.

18. Identify the best way to improve the underlined part of the given sentence. If there is no improvement required, select 'no Improvement'.

Hold <u>hands of your child</u> while crossing the road.

A. your child's hands
B. your child's hand
C. hand of your child
D. No improvement

Ans. B

Sol. While crossing a road, a single hand is held not both hands. So, it is incorrect to say hold hands. Apart from this, the sentence should use apostrophe (') as it is used to denote ownership and make the sentence concise. The sentence must be written as "hold your child's hand while crossing the road". Hence, option B is the correct answer.

19. Choose the most appropriate option to change the voice (active/passive) form of the given sentence.

Have you been invited by Krishna?

A. Have you invited Krishna?
B. Has Krishna invited you?
C. Does Krishna have invited you?
D. Has Krishna invite you?

Ans. B

Sol. The given sentence is in passive voice. The structure for passive/active voices would be:
Passive: Has/have + Object + Verb (IIIrd form) + by + subject...?
Active: Has/have + subject + verb (IIIrd form) + object...?
So, the active voice of the given sentence would be:
Has Krishna invited you?
Hence, option B is the correct answer.

20. Select the most appropriate meaning of the idiom given in bold in the sentence.

There was a job for me **to cut my teeth on.**

A. to gain experience
B. to try
C. to sharpen my wits
D. to earn a decent salary

Ans. A

Sol. The idom "cut your teeth on something" means to do something that gives you your first experience of a particular type of work. Hence, option A is the correct answer.

21. Which one of these heat treatment processes produces bainite?

A. Normalizing
B. Tempering
C. martempering
D. Austempering

Ans. D

Sol. **Austempering**

- It is a interrupted quenching process which is used to obtain the bainitic structure.
- It is used to increase strength, toughness, and ductility at a given hardness and it also reduces distortion.
- Austempering cycle would include heating to a temperature within the austenitizing range i.e 790 °C to 910 °C and quenching in a salt bath maintained at a constant temperature in range of 260 °C to 400°C.

22. What does NTU indicate?

A. Effectiveness of heat exchanger
B. Efficiency of heat exchanger
C. Size of heat exchanger
D. Temperature drop in heat exchanger.

Ans. C

Sol. $NTU = \frac{UA}{C_{min}}$

Hence, NTU is directly proportional to area (A) of the heat exchanger.

23. What is the expression for the crippling load for a column of length l with one end fixed and other end free?

A. $P = \frac{2\pi^2 EI}{I^2}$
B. $P = \frac{\pi^2 EI}{4I^2}$
C. $P = \frac{4\pi^2 EI}{I^2}$
D. $P = \frac{\pi^2 EI}{I^2}$

Ans. B

Sol. $P_E = \frac{\pi^2 EI}{L_{eq}^2}$

for one end fixed and other if free $L_{eq} = 2l$

24. Supersaturated condition occurs in a steam expanding through a convergent-divergent nozzle because of the delay in

A. change of dryness fraction
B. change of superheat
C. evaporation process
D. condensation process

Ans. D

Sol. Since the transition is very fast the condensation cannot take place and hence the steam becomes supersaturated i.e., carries moisture more than the saturation limit.

25. A 4 mm thick metal sheet is rolled with 200 mm diameter rolls to reduce thickness without any change in its width.The friction coefficient at the work roll interface is 0.1 What is the minimum possible thickness of the sheet that can be produced in a single pass___?

A. 1.5 mm
B. 2.5 mm
C. 3 mm
D. 3.5 mm

Ans. C

Sol. Given,

Thickness metal sheet= 4 mm

Diameter=200 mm

$\Delta h_{max} = \mu^2 R$

$h_1 - h_2 = 0.1^2 \times 100$

$4 - h_2 = 1$

$h_2 = 3$ mm

26. At critical point the enthalpy of vaporization is

A. dependent on temperature only
B. maximum
C. minimum
D. zero

Ans. D

Sol. At critical point enthalpy of vaporization is zero.

27. Determine the min pressure allowed in the system to avoid cavitation. In a water distribution system, the temperature of water is observed to be as high as 31 °C

A. 4.25 kPa
B. 3.52 kPa
C. 5.24 kPa
D. 4.52 kPa

Ans. A

Sol. Properties: The vapour pressure of water at 31 °C is 4.25 kPa.

To avoid cavitation, the pressure anywhere in the flow should not be allowed to drop below the vapour (or saturation) pressure at the given temperature.

That is,

$P_{min} = P_{sat\ @\ 31\ °C} = 4.25$ kPa

Therefore, the pressure should be maintained above 4.25 kPa everywhere in the flow.

Note that the vapour pressure increases with increasing temperature, and thus the risk of cavitation is greater at higher fluid temperatures.

28. A helical compression spring is to be designed for a force of 200N. The spring index of the spring, if mean coil diameter is 48 mm and wire diameter is 9.6 mm.

A. 3 B. 4

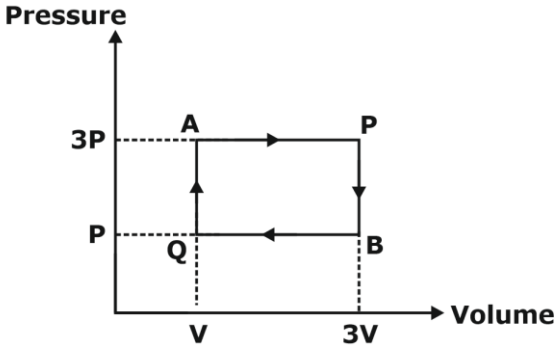
C. 5 D. 6

Ans. C

Sol. Given: D = 48 mm d = 9.6 mm

$$\text{Spring index, } C = \frac{D}{d} = \frac{48}{9.6} = 5$$

29. In PV diagram shown, find total work done by gas during the cycle?




A. -3PV B. 4PV

C. – 2PV D. - 4PV

Ans. B

Sol. Since the cycle is *clockwise*, so *work is done by the gas is negative.* Area enclosed by the closed curve gives the work done during one cycle. Therefore, work done on the gas, $W$ = 6PV-0-2PV-0=4PV

30. In a vapour compression system, superheating of the refrigerant decreases COP, the reason being:

1. Increase of work input to the compression
2. It does not depend on refrigeration effect

Which of the above statements is/are correct?

A. 1 only B. 2 only

C. Both 1 and 2 D. Neither 1 nor 2

Ans. A

Sol. vapour compression refrigeration systems are the most commonly used among all refrigeration systems. As the name implies, these systems belong to the general class of vapour cycles, wherein the working fluid (refrigerant) undergoes phase change at least during one process. In a vapour compression refrigeration system, refrigeration is obtained as the refrigerant evaporates at low temperatures. The input to the system is in the form of mechanical energy required to run the compressor. Hence these systems are also called as mechanical refrigeration systems.

31. Using the table given below, calculate the six week moving average forecast for the 16th week.

| Week | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|
| Demand (units) | 105 | 115 | 120 | 140 | 135 | 116 |

A. 122 B. 134

C. 120 D. 118

Ans. A

Sol. 6 week moving average forecast for 16th week

$$= \frac{1}{6}[105 + 115 + 120 + 140 + 135 + 116]$$

$F_6$ = 121.83 units.

32. 100 kJ of energy is transferred from a heat reservoir at 1000 K to a heat reservoir T 500 K. The ambient temperature is 300 K. The loss of available energy due to heat transfer process is

A. 20 kJ B. 30 kJ

C. 40 KJ D. 50 KJ

Ans. B

Sol. $T_H$ = 1000, $T_c$ = 500, $T_o$ = 300, Q = 100 kJ

∴ Irreversibility

$$I = QT_0\left(\frac{T_H - T_L}{T_H T_L}\right)$$

$$I = 100 \times 300\left(\frac{1000 - 500}{1000 \times 500}\right)$$

I = 30 kJ

33. An offset provided in radial cam-translating-follower mechanism serves to

A. decrease the pressure angle during ascent of the follower

B. increase the pressure angle during ascent of the follower

C. avoid possible obstruction due to some machine parts

D. decrease the pressure angle during descent of the follower

Ans. A

Sol. At the time of ascent of follower, the required pressure to push the follower is more. By decreasing the pressure angle, thrust can be reduced. There are many ways to decrease the pressure angle between cam and follower like attaching roller to the follower at contact point, giving curve shape to the follower at the contact point and Providing offset.

34. The critical point in shaft design will appear:

i. at a point where diameter change occur

ii. at a point having higher torque and bending moment

iii. at stress concentration point

A. both i and ii
B. both ii and iii
C. i, ii and iii
D. only iii

Ans. C

Sol. Critical points includes where a change of diameter, values of torque and bending moment occurs along with stress concentrations.

35. The enthalpy drop for flow through convergent horizontal nozzles is 100 kJ/kg. If the velocity of approach at inlet to the nozzle is negligible, the exit velocity of the fluid is

A. 20 m/s
B. 400 m/s
C. 447.2 m/s
D. 520.8 m/s

Ans. C

Sol. **Enthalpy drop (dh)= h1-h2= 100kJ/kg (given) so we dont require h2.**

Applying steady flow energy equation at inlet and exit of nozzle and neglecting change in datum and assuming no heat and work transfer

$$h_1 + \frac{V_1^2}{2} = h_2 + \frac{V_2^2}{2}$$

$V_1 = 0$

$$V_2 = \sqrt{2(h_1 - h_2)}$$

$$V_2 = \sqrt{2(100 \times 1000)}$$

$$V_2 = 447.2 \text{ m/s}$$

36. Given below are four vee twin engines with different included angles between cylinder axes. Which one of these engines can be completely balanced for primary forces by attaching a single revolving mass opposite to the crank pin?

A. Vee 40° twin engine
B. Vee 90° twin engine
C. Vee 60° twin engine
D. Vee 120° twin engine

Ans. B

Sol. Vee 90º twin engine can be completely balanced for primary forces by attaching a single revolving mass opposite to the crank pin.

37. Which one of the following cutting tool bits are made by powder metallurgy process?

A. Carbon steel tool bits
B. Stellite tool bits
C. Ceramic tool bits
D. HSS tool bits

Ans. C

Sol. A tool bit is a non-rotary cutting tool used in metal lathes, shapers, and planers. Carbide, ceramics (such as cubic boron nitride) and diamond, having higher hardness than HSS, all allow faster material removal than HSS in most cases. Ceramic tool bits are made by powder metallurgy.

38. The resultant of two forces acting at 60 ° is 7 N and when acting at right angles is $\sqrt{34}$ N. The forces are

A. 25 N and 9 N
B. 3 N and $\sqrt{5}$ N
C. 3 N and 5 N
D. $\sqrt{3}$ N and $\sqrt{5}$ N

Ans. C

Sol. wkt, the resultant of two forces is given by

$R^2 = A^2 + B^2 + 2AB \cos F$

Case 1: F= 60 °, cosF = 1/2

$49 = A^2 + B^2 + A B$

Case 1: F= 90 °, cosF = 0

$34 = A^2 + B^2$

Therefore, A.B = 15

Hence, the two forces are 3N and 5N

39. Determine the MRR (material removal rate) in $mm^3/s$ for a work-piece of steel bar (dia = 200 mm) rotating at 160 rpm, which is turned at a feed = 0.25 mm/rev with a depth of cut of 4 mm.

A. 575.3
B. 1278.5
C. 1675.5
D. None of the above

Ans. C

Sol. $\text{MMR} = fdV = fd \times \frac{\pi DN}{60} \text{mm/s} = 0.25 \text{ mm} \times 4 \text{ mm} \times \frac{\pi \times 200 \times 160}{60} \text{mm/s} = 1675.5 \text{ mm}^3/\text{s}$

40. Which cycle consists of two reversible isotherms and two reversible isobars?

A. Carnot cycle
B. Stirling cycle
C. Ericsson cycle
D. Brayton cycle

Ans. C

Sol. Two reversible isotherms and two reversible isobars is represented by Ericsson cycle.

41. If the ratio of the length of a connecting rod to the crank radius increases then

A. Primary unbalanced force decrease
B. Primary unbalanced force increase
C. Secondary unbalanced force decrease
D. Secondary unbalanced force increase

Ans. C

Sol. Secondary unbalanced force $= \frac{mr\omega^2 \cos 2\theta}{n}$

Where, $n = \frac{l}{r}$

As n increases, secondary unbalance force decreases.

42. If the mass flow rate, $\dot{m}$=0.699 kg/s, the refrigeration capacity is 50KW and the condition at the condenser exit $h_3$ = 94.9 kJ/kg, then calculate the value of $h_1$ at the compressor inlet _____.

A. 166.43 kJ/kg
B. 66 kJ/kg
C. 56 kJ/kg
D. None

Ans. A

Sol. Refrigeration Capacity = $\dot{m}$ ($h_1$ – $h_3$)

50 = 0.699 ($h_1$ – 94.9 )

$h_1 = 166.43 \frac{kJ}{kg}$

43. As a ship enters into a river from sea, one can expect that

A. It rises a little
B. It sinks a little
C. It remains at the same level
D. Its level depends on the material used for construction.

Ans. B

Sol. As a ship enters into a river from sea, one can expect that it sinks a little because of some Buoyancy force acts.

44. 2 liters of petrol weighs 16 N calculate its specific weight?

A. 5000 N/ $m^3$
B. 6000 N/ $m^3$
C. 8000 N/ $m^3$
D. 4000 N/ $m^3$

Ans. C

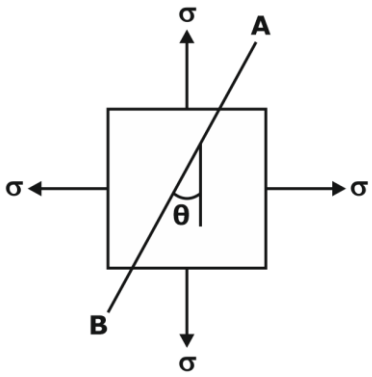
Sol. 2 liter = $2*10^{-3}$ $m^3$

Specific weight (w) = weight / volume

= $16/2*10^{-3}$

= 8000 N/ $m^3$

45. A point in two–dimensional stress state, is subjected to biaxial stress as shown in the above figure. The shear acting on the plane AB is




A. Zero
B. σ
C. $\sigma \cos^2 \theta$
D. σsin θ. cos θθ

Ans. A

Sol. $\tau = -\left(\frac{\sigma_x - \sigma_y}{2}\right)\sin 2\theta$

Here, $\sigma_x = \sigma_y$

$\tau = -\left(\frac{\sigma - \sigma}{2}\right)\sin 2\theta = 0$

46. Economizer in boiler

A. Increases steam pressure
B. Increases steam flow
C. Decreases fuel consumption
D. Decreases steam pressure

Ans. C

Sol. A common application of economizers in steam power plants is to capture the waste heat from boiler stack gases (flue gas) and transfer it to the boiler feedwater. This raises the temperature of the boiler feedwater, lowering the needed energy input, in turn reducing the firing rates needed for the rated boiler output.

47. Which of the following is not an assumption of merchant's circle analysis

A. cutting is oblique
B. material is rigid and perfectly plastic
C. material is homogeneous
D. cutting edge is straight and sharp

Ans. A

Sol. cutting is assumed orthogonal in merchant's circle analysis.

48. Which of the following pairs describe the correct coordination number for body centred cubic and face centred cubic unit cell structures respectively?

A. 8 and 6
B. 12 and 8
C. 6 and 8
D. 8 and 12

Ans. D

Sol. Coordination number relates the number of equidistant nearest neighbors an atom has, and is different for FCC, BCC, and HCP structures.

Coordination number for FCC is 12.

Coordination number for BCC is 8.

Coordination number for HCP is 12.

49. In which type of the impeller of centrifugal pump, the head remains constant with variation in discharge?

A. Forward curved vanes
B. Radial vanes
C. Backward curved vanes
D. Both forward and backward curved vanes

Ans. B

Sol. For radial curved vanes head remains constant with variation in discharge.

50. A block of mass 4 kg is placed on a rough horizontal plane. A time dependent force $F = kt^2$ acts on the block, where $k = 2\ Ns^{-2}$, Coefficient of friction $\mu = 0.8$. Force of friction between block and the plane as $t = 2$ s is

A. 8 N
B. 4 N
C. 2 N
D. 32 N

Ans. A

Sol. $f_{max} = \mu mg = 0.8 \times 4 \times 10 = 32$ N

At $t = 2s$, $F = kt^2 = (2)(2)^2 = 8N$

Since applied force $f < f_{max}$, force of friction will be 8N

51. The deformation of a bar under its own weight as compared to that when subjected to a direct axial load equal to its own weight will be

A. The same
B. One-fourth
C. Half
D. Double

Ans. C

Sol. $(\delta L)_{\text{own weight}} = \dfrac{WL}{2AE}$

$(\delta L)_{\text{Axial load}} = \dfrac{WL}{AE}$

52. Which one of the following are the most likely characteristics in centrifugal casting?

A. Fine grain size and high porosity
B. Coarse grain size and high porosity
C. Fine grain size and high density
D. Coarse grain size and high density

Ans. C

Sol. The correct option is C

Advantages of centrifugal casting.

Casting acquires high density and are distinguished for their fine grained structure and high mechanical strength.

53. Match **List-I** (Non-dimensional Number) with **List-II** (Application) and select the correct answer using the code given below the lists:

**List-I**

A) Grashoff number

B) Stanton number

C) Sherwood number

D) Fourier number

**List-II**1) Mass transfer

2) Unsteady state heat condution

3) Free convection

4) forced convection

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

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

Ans. B

Sol. A) Grashoff number : Free convection

B) Stanton number : Forced convection

C) Sherwood number : Mass transfer

D) Fourier number : Unsteady state heat conduction

54. What is the ratio of thermal conductivity to electrical conductivity equal to?

A. prandti number B. Schmidt number

C. Lorenz number D. Lewis number

Ans. C

Sol. $\text{Lorenz number} = \dfrac{\text{Thermal conductivity}}{\text{Electrical conductivity}}$

55. Which one of the following is not a necessary information input to Material Requirements Planning?

A. Inventory on hand B. Bill of materials

C. Sequence of operations on a job D. Master production schedule (MPS)

Ans. C

Sol. Input to material requirement planning.

1). Inventory on hand.

2). Bill of materials.

3). Master production schedule.

Hence Sequence of operations on a job is not a necessary information

56. In power transmission shafts, if the polar moment of inertia of a shaft is doubled, then what is the torque required to produce the same angle of twist?

A. ¼ of the original value
B. ½ of the original value
C. Same as the original value
D. Double the original value

Ans. D

Sol. When J is doubled T will be doubled.

$$T = \frac{GJ\theta}{L} \quad T \prec J$$

$$\frac{T_1}{J_1} = \frac{T_2}{J_2}, 2J_1 = J_2$$

So, $2T_1 = T_2$

57. A fan consumes 20 W of electric power and discharges air from a ventilated room at 0.25 kg/s. The maximum air outlet velocity is nearly

A. 4.7 m/s
B. 8.7 m/s
C. 10.2 m/s
D. 12.7 m/s

Ans. D

Sol. Given, Power = 20W

m = 0.25kg/s

$$\text{power} = \frac{1}{2}\dot{m}V^2$$

$$20 = \frac{1}{2} \times 0.25 \times V^2$$

V =12.7m/s

58. Which one of the following automobile exhaust gas pollutants is a major cause of photochemical smog?

A. CO
B. HC
C. $NO_x$
D. $So_x$

Ans. C

Sol. $NO_x$ is one of the primary cause of photochemical smog. Smog is formed by the photo chemical reaction of automobile exhaust and atmospheric air in presence of sunlight, $NO_2$ decomposes into NO and mono atomic oxygen.

$NO_2$ + energy from sunlight $\rightarrow$ NO + O + smog + O + $O_2 \rightarrow O_3$

59. Anti friction bearings will:

A. high starting friction at low speed
B. low shock loading resistance
C. have radial and thrust loads
D. adjust little shaft misalignments

Ans. C

Sol. Anti friction bearings have low starting and running friction at moderate speeds and have high resistance to shock loading. These bearings will have radial and thrust loads having high initial cost. The self aligning bearing will able to adjust certain amount of misalignments of shaft.

60. A 1200 mm steel plate is welded by Arc welding process using welding current of 200A, Arc voltage 30V and welding Speed of $200\frac{mm}{min}$ ,If the heat transfer efficiency = 0.75 and Surface resistance is 50 micro ohm the heat input will be____.

A. 440J
B. 540J
C. 200J
D. None of these

Ans. B

Sol. Given,

Welding length = 1200 mm

Welding speed = $\frac{200\ mm}{mm}$

Heat transfer eff. = 0.75

and Surface Resistance =50 μ Ω= $50 \times 10^{-6}$ Ω

Current = 200A

$$\text{Welding time} = \frac{\text{Welding length}}{\text{Welding speed}} = \frac{1200}{200} = 6\ \text{min} = 360\ \text{sec}.$$

Heat generated = $\eta_{HT}\ I^2Rt$

$= 0.75 \times (200)^2 \times 50 \times 10^{-6} \times 360$

= 540 Joule

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Classroom

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