

HAL MT 2022

Mechanical Engineering

Sample Question Paper

Questions & Answer Key

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

EHGI : LONP :: ? : ORQS

- A. GJIK
- B. GIHJ
- C. HKJL
- D. HJIK

Ans. C

2. How many meaningful English words can be made with the letters RTOU using each letter only once in each word?

- A. None
- B. One
- C. Two
- D. Three
- E. More than three

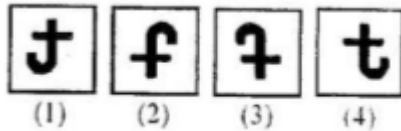
Ans. C

3. Select the correct option that will be the mirror reflection of the problem figure.

Problem figure:



Answer figures:



- A. Fig.(1)
- B. Fig.(2)
- C. Fig.(3)
- D. Fig.(4)

Ans. C

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

Inch, Decameter, Foot, ?

- A. Decimeter
- B. Millimeter
- C. Centimeter
- D. Meter

Ans. D

5. Each letter of the alphabet from Z to A has been given a value from 1 to 26 serially. What is the total value of the word **CONSEQUENCE**?

- A. 137
- B. 154
- C. 196
- D. 176

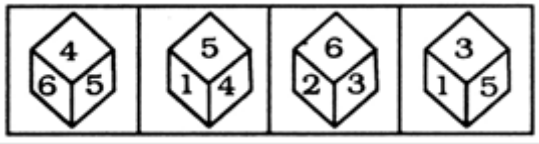
Ans. D

6. If A stands for 'addition', M for 'multiplication', D for 'division', G for 'greater than' and L for 'Lesser than' then which of the following will be logically correct?

- A. 20A 4D 4L 4A 6D2
- B. 20D 5G 8D 4A 6M3
- C. 20D 4A 4L 4A 2M3
- D. 20A 2G 10M 3A 12D2

Ans. C

7. Four positions of a dice are given below Identify the number of the bottom when the number on the top is 2.



- A. 3
- B. 5
- C. 4
- D. 6

Ans. B

8. In a row, there are 12 professors between Akash and Bhumi and Akash being the first professor in the row. There are 6 professors between Bhumi and Charu. If there are 15 professors after Charu, then how many minimum professors are there in the row?

- A. 21
- B. 24
- C. 20
- D. 22

Ans. D

9. Nikhil is 8 yr younger than his brother Rohan. How old will Rohan be when he is twice as old as Nikhil ?

- A. 4 yr
- B. 6 yr
- C. 8 yr
- D. 16 yr

Ans. D

10. The age of Ram is double as that of Shyam and half as that of Suresh. If the sum of their ages is 70, what is the age of Ram?

- A. 20
- B. 30
- C. 40
- D. 10

Ans. A

11. In the following question, select the related word from the given alternatives.

Spiritual : Belief :: Orchestral : ?

- A. Theatre
- B. Situation
- C. Music
- D. Direction

Ans. C

12. Seven people D, E, F, G, H, I and J are sitting in a row.

- 1) J is third to the left of H
- 2) D is immediate right of G
- 3) F sits at one of ends which is immediate left of J.
- 4) E is next to the right of H and I is fifth to the right of J.

Who sits at the extreme right end?

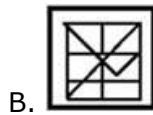
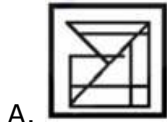
- A. D
- B. F
- C. I
- D. H

Ans. C

13. **Select the option figure which contains figure X embedded in it as its part. (Rotation is not allowed)**



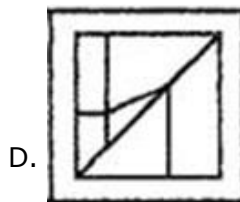
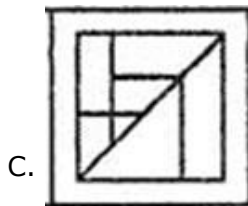
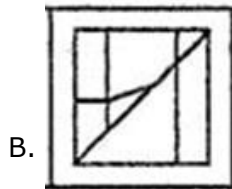
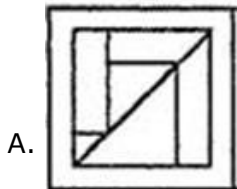
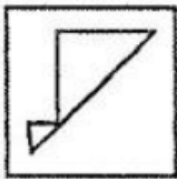
Figure-X



Ans. B

14. From the given answer figures, select the one in which the question figure is hidden/embedded.

Question Figure :



Ans. A

15. **Direction:** Select the related word/letters/ number from the given alternatives.

BAD : CBE :: ? : IVSU

A. GOOD

B. HSPR

C. HALT

D. HURT

Ans. D

16. A car travels 20 miles in the same time as another car, travelling 20 MPH faster, covers 30 miles. How long does the journey take?

A. 31 minutes

B. 29 minutes

C. 30 minutes

D. 28 minutes

Ans. C

17. Common **In the following question one statement is given followed by two assumptions I and II. You have to consider the statement to be true even if it**

seems to be at variance from commonly known facts. You have to decide which of the given assumptions, if any, follow from the given statement. End

Statement: Politicians become rich by the votes of the people.

Assumptions:

I. People vote to make politicians rich.

II. Politicians become rich by their virtue.

A. Only I is implicit

B. Only II is implicit

C. Both I and II are implicit

D. Both I and II are not implicit

Ans. D

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

HI, MN, RS, ?

A. XY

B. WX

C. WY

D. WE

Ans. B

19. In a certain code language, "BRING" is written as "25698" and "JAIL" is written as "4367". How is "BRINJAL" written in that code language?

A. 2566437

B. 2569437

C. 2569347

D. 2659437

Ans. B

20. In a certain code language, "CONDITION" is written as "@#^\$*!#^". How is "NOTION" written in that code language?

A. ^#!*^#

B. ^!##^

C. ^#*!#^

D. ^#!*#^

Ans. D

21. Common

In the sentence identify the segment which contains the grammatical error. If the sentence has no error, then select 'No error'.

End

The law should specifically provide a clause to protect animals from poachers.

A. The law should specifically

B. provide a clause

C. to protect animals from

D. No Error

Ans. D

22. Common **Select the most appropriate option to fill in the blank.** End

I _____ to the movies with some friends last night.

A. have gone

B. went

C. am gone

D. am going

Ans. B

23. Common

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

End

Why did he punish you?

- A. Why I was punished by him?
- B. Were you punished by him?
- C. Why were you punished by him?
- D. I was punished by him.

Ans. C

24. Common In this section, direct speech sentences are given and you are required to find the correct indirect speech sentence of the same. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly. End

She said, "Good bye Ramesh".

- A. She bade Ramesh good bye.
- B. She bade to Ramesh good bye.
- C. She bids Ramesh good bye.
- D. She had bade Ramesh good bye.

Ans. A

25. Common

Direction: In the following question, the first and the last parts of the passage/sentence are numbered (1) and (6). The rest of the passage/sentence is split into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the sentences and find out which of the four combinations is correct and mark the respective option.

End

1. As whalers reduced catches of the larger whales, they switched to smaller species.

P. By 1985, the situation had reversed and the number of minke whales killed was far higher than that of sei whales.

Q. By 1975 catches of the two species were equal.

R. We can clearly see this when we compare figures for the Antarctic catch of the larger sei whales with those for small minke whales.

S. In 1970, ten times as many sei whales as minke whales were caught.

6. The graph shows that while the sei catch was reduced by 90% between 1970 and 1985, over the same period the minke whale catch was ten times greater.

- A. SQPR
- B. PQRS
- C. RSQP
- D. SRQP

Ans. C

26. Common

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

End

The policeman captured first car that approached and ordered the driver to take the injured child to the hospital.

- A. commandeered the first car that
- B. interrupted the first car who
- C. captured the first car whom
- D. No improvement

Ans. A

27. Common

Direction: Select the most appropriate meaning of the given idiom.

End

Make both ends meet

- A. to lead a lavish life
- B. to live by begging
- C. earn just enough money to live on
- D. to lead an active life

Ans. C

28. In this section, a word is spelled in four different ways. You are to identify the one which is correct. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly.

- A. Quaint
- B. Qaint
- C. Quiant
- D. Quaaint

Ans. A

29. Common

Direction: Select the most appropriate antonym of the given word.

End

DEVIOUS

- A. straight
- B. obvious
- C. simple
- D. superficial

Ans. A

30. Common

Select the word which means the same as the group of words given.

End

A person who insists on adherence to formal rules or literary meaning

- A. scholar
- B. pedant
- C. pedagogue
- D. literalist

Ans. B

31. Common **In the sentence, identify the segment which contains the grammatical error. If the sentence has no error, then select 'No error'. |||End|||**

While he was walking along the road a speeding car knocked down to him.

- A. While he was walking along the road
- B. a speeding car
- C. knocked down to him
- D. No error

Ans. C

32. Common **Select the most appropriate option to fill in the blank.** End

I can _____ him without qualifications.

- A. recommend
- B. commend
- C. praise
- D. disregard

Ans. A

33. Common **Choose the most appropriate option to change the voice (active/passive) form of the given sentence.** End

People thronged the grounds.

- A. The grounds will be thronged with people.
- B. The grounds were thronged by people.
- C. The grounds were thronged with people.
- D. The grounds will be thronged by people.

Ans. C

34. Common

Choose the most appropriate option to change the narration (direct/indirect) of the given sentence.

End

My little brother said, "I wish it rains hard, so I don't have to go to school."

- A. My little brother earnestly wished that it should rain so hard that he did not have to go to school.
- B. My little brother earnestly wished that it should rain so hard that he would not have to go to school.
- C. MY little brother earnestly wished that it will rain so hard that he would not have to go to school.
- D. My little brother earnestly wished that it could rain so hard that he would not have to went school.

Ans. B

35. Common

Direction: In the following question, the first and the last parts of the passage/sentence are numbered (1) and (6). The rest of the passage/sentence is split into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the sentences and find out which of the four combinations is correct and mark the respective option.

End

1. Research was carried out recently to measure noise pollution.

P. The local hospital had also reported large number of patients suffered from headache.

Q. It was found that the noise level during peak traffic hours reached 130 decibels.

R. This has lead to many health problems.

S. The incidence of deafness has been 4.6 times higher than the normal as reported by the local hospital.

6. During night loud music has caused sleeplessness among people.

- A. RPSQ
- B. QRSP
- C. PSRQ
- D. SRPQ

Ans. B

36. Common

Select the alternative that will improve the underlined part of the sentence; if no improvement is required, select "No improvement".

End

A citizen is expected to give allegiance to his country of origin.

- A. homage
- B. loyalty
- C. obedience
- D. No improvement

Ans. D

37. Common

Select the most appropriate meaning of the given idiom.

End

A gerrymandering way

- A. in a legal and constitutional manner
- B. in a judicial and fair way
- C. in a manipulative and unfair way
- D. in a dictative manner like the Germans

Ans. C

38. In this section, a word is spelled in four different ways. You are to identify the one which is correct. Choose the correct response (a), (b), (c) or (d) and indicate on the Answer Sheet accordingly.

- A. Recommand
- B. Recommend
- C. Recommend
- D. Recomend

Ans. B

39. Common

Direction: Select the most appropriate synonym of the given word.

End

PERQUISITE

- A. incentive
- B. privilege
- C. treat
- D. award

Ans. B

40. Common

Select the word which means the same as the group of words given.

End

all the arts, beliefs and social institutions etc. characteristic of a race

- A. culture
- B. native
- C. infrastructure
- D. ritual

Ans. A

41. In which of the following towns is "Moti Masjid" situated?

- A. Agra
- B. Jaipur
- C. Lahore
- D. Ahemdabad

Ans. A

42. Which of the following prominent leaders wrote the book 'Citizen Delhi: My Life, My Times'?

- A. Arun Jaitley
- B. Sheila Dikshit
- C. Harsh Vardhan
- D. Arvind Kejriwal

Ans. B

43. In which state is 'Tarnetar' fair celebrated annually?

- A. Gujarat
- B. Telangana
- C. Madhya Pradesh
- D. Manipur

Ans. A

44. JP Nadda was elected as the President of the Bharatiya Janata Party (BJP) on 20 January 2020. He is the _____ president of the BJP.

- A. twelfth
- B. tenth
- C. eleventh
- D. ninth

Ans. C

45. Which state has bagged the top position under the Pradhan Mantri Surakshit Matritav Abhiyan (PMSMA)?

- A. Odisha
- B. West Bengal
- C. Himachal Pradesh
- D. Assam
- E. Gujarat

Ans. C

46. _____ is the oldest hockey tournament in India.

- A. Beighton Cup
- B. Bombay Gold Cup
- C. Obaidullah Khan Gold Cupe
- D. MCC Murugappa Gold Cup

Ans. A

47. International Astronomical Union (IAU) named minor planet 2006 VP32 (number - 300128) in September 2019 after a famous Indian. Who is this Indian?

- A. Pandit Jasraj
- B. APJ Abdul Kalam
- C. Viswanathan Anand
- D. Hamsa Padmanabhan

Ans. A

48. What was the tenure of 6th Prime Minister of India 'Rajiv Gandhi'?

- A. 1984-1988
- B. 1983-1990
- C. 1984-1989
- D. 1983-1988

Ans. C

49. Which one of the following is an Audio Tool?

- A. Avidemus
- B. Ardour
- C. Dscaler
- D. Blender

Ans. B

50. Bengali is the official language of _____.

- A. Uttarakhand
- B. Tripura
- C. Kerala
- D. Chhattisgarh

Ans. B

51. What are the basic, functions of Public Accounts Committee (PAC)?
- A. to examine the statement of accounts showing the income and expenditure of state corporations, trading and manufacturing schemes and projects.
 - B. to examine the accounts of stores and stocks.
 - C. to examine the statement of accounts of autonomous bodies
 - D. All of the above

Ans. A

52. Transistors belong to which of the following generation of computers?
- A. Fourth
 - B. Third
 - C. First
 - D. Second

Ans. D

53. The Parliament and the constitution are the instruments of
- A. Legal Justice
 - B. Political Justice
 - C. Economic Justice
 - D. All of these

Ans. D

54. Indian Constitution is:
- A. Federal
 - B. Quasi Federal
 - C. Unitary
 - D. Presidential
 - E. none of these

Ans. B

55. Sulphur Dioxide pollution is indicated by an excessive growth of which of the following?
- A. Algal Blooms
 - B. Lichens
 - C. Bryophytes
 - D. Protozoa

Ans. B

56. Which of the following islands is located in the Arabian Sea?
- A. Andaman Islands
 - B. Nicobar Islands
 - C. Lakshadweep Islands
 - D. All of the above

Ans. C

57. On 10 April 2017, Lok Sabha passed Constitution (123rd Amendment) Bill, 2017. The Bill seeks to give Constitutional Status to _____.
- A. National Human Rights Commission
 - B. National Commission on Backward Classes
 - C. National Finance Commission
 - D. National Commission for Women

Ans. B

58. Which company manufactured the first microprocessor 4004?
- A. NVIDIA Corporation
 - B. PLX Devices
 - C. INTEL Corporation
 - D. ENOcean Private Company

Ans. C

59. The centre of a cyclone is a calm area is called the _____ of the storm.
- A. point
 - B. needle
 - C. eye
 - D. limit

Ans. C

60. Who has been appointed as the Press Attache of India's Olympic contingent at the Tokyo Olympic Games 2021?

- A. Narinder Batra
- B. B K Sinha
- C. Rajeev Mehta
- D. Anirban Lahiri
- E. Anurag Thakur

Ans. B

61. The total number of instantaneous centers for a mechanism consisting of 'n' links is

- A. $n/2$
- B. n
- C. $(n-1)/2$
- D. $n(n-1)/2$

Ans. D

62. A lead – screw with half nuts in a lathe, free to rotate in both directions has

- A. V- threads
- B. Whitworth threads
- C. Buttress threads
- D. ACME threads

Ans. D

63. The ratio of ω/ω_n for which the transmitted force is equal to the exciting force under no damping conditions____?

- A. $1/\sqrt{2}$
- B. $\sqrt{2}$
- C. 2
- D. $1/2$

Ans. B

64. A straight bar having a constant cross sectional area A, length L and weight W, is hanging vertically. If E is the young's modulus of the material of the bar, total increase in length of the bar due to its own weight only will be

- A. $\frac{WL}{2AE}$
- B. $\frac{WL}{AE}$
- C. $\frac{2WL}{AE}$
- D. $\frac{4WL}{AE}$

Ans. A

65. Which of the following statement is correct regarding Clausius statement of second law of thermodynamics _____.

- A. Heat can't be transferred from low temperature body to high temperature body
- B. Heat can be transferred from low temperature body to high temperature body by using refrigeration cycle
- C. Heat can't be transferred from low temperature body to high temperature body without the consuming any other form of energy
- D. Heat can be transferred from low temperature body to high temperature body if COP of the process is more than unity

Ans. C

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

A. $\frac{\pi^2 EI}{I^2}$

B. $\frac{\pi^2 E I'}{4 I^2}$

C. $\frac{4\pi^2 E I'}{I^2}$

D. $\frac{2\pi^2 E I'}{I^2}$

Ans. C

67. What is the specific name of the equation governing three- dimensional steady state heat conduction with self-heat generation _____?

- A. Fourier equation
- B. Laplace equation
- C. Poisson equation
- D. Diffusion equation

Ans. C

68. The deaerator in thermal power plants is used mainly to?

- A. Reduce steam pressure
- B. Remove air from condenser
- C. Remove dissolved gases from feed water
- D. Increase fire water temperature

Ans. C

69. Using the Buckingham Pi (n) theorem, the relevant parameters are density, viscosity, bulk modulus, rotational speed. The number of independent non-dimensional groups are _____?

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

Ans. A

70. Hydrodynamic entrance length for laminar flow is

- A. Less than the turbulent length
- B. Greater than the turbulent flow
- C. Equal to turbulent flow
- D. No such relation

Ans. B

71. Two shafts X and Y are made of steel. The diameter of the second shaft is half as that of the first shaft. The ratio of the power of X to Y for the same shear stress is _____.

- A. 2
- B. 4
- C. 8
- D. 16

Ans. C

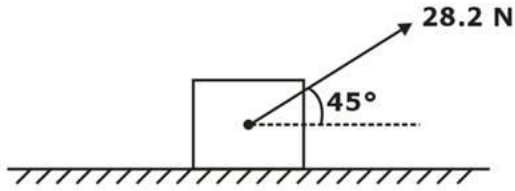
72. Joule-Thomson coefficient is the ratio of _____.

- A. pressure change to temperature change occurring when a gas undergoes the process of adiabatic throttling
- B. temperature change to pressure change occurring when a gas undergoes the process of adiabatic throttling
- C. temperature change to pressure change occurring when a gas undergoes the process of adiabatic compression

D. pressure change to temperature change occurring when a gas undergoes the process of adiabatic compression

Ans. B

73. A body of weight 50 N placed on a horizontal surface is just moved by a force of 28.2 N. The frictional force and normal reaction are :-



- A. 2N, 3N
- B. 5N, 6N
- C. 10N, 15N
- D. 20N, 30N

Ans. D

74. Which one of the following statement is not correct ?

- A. Assignment model is a special case of a linear programming problem
- B. In queueing models, Poisson arrivals and exponential services are assumed
- C. In transportation problem, the non-square matrix is made square by adding a dummy row or dummy column
- D. None of these

Ans. D

75. A pitot tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 10 m and the static pressure head is 5 m. The velocity of flow is closest to

- A. 8 m/s
- B. 10 m/s
- C. 12 m/s
- D. 15 m/s

Ans. B

76. The force requirement in a blanking operation of low carbon steel is 5 kN. The thickness of sheet is t and diameter of blanked part is d . For the same work material, if diameter of the blanked part is increased $1.5d$ and thickness is reduced to $0.8t$, the new blanking force (in kN) is _____.

- A. 6
- B. 4.5
- C. 290.7
- D. 8

Ans. A

77. Match the following List 1 and List 2:

List 1:

- A. M05
- B. G01
- C. G04
- D. G90

List 2:

- 1. Absolute coordinate system

- 2. Dwell
- 3. Spindle stop
- 4. Linear interpolation

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

Ans. C

78. During a psychometric process, the latent heat added is 20 kJ/s and the sensible heat added is 30 kJ/s. Determine the Sensible heat factor:

- A. 0.3
- B. 0.6
- C. 0.6777
- D. 1.5

Ans. B

79. What is the ratio of the maximum shear stress to average shear stress for a beam with rectangular cross section?

- A. 2/3
- B. 3/2
- C. 4/3
- D. 9/8

Ans. B

80. The demand and forecast in a Manufacturing plant for November are 17000 and 15500 orders respectively. By using simple exponential smoothing method, forecast for the month of December will be? Use smoothing coefficient= 0.26

- A. 16890
- B. 1589
- C. 15890
- D. 15690

Ans. C

81. The maximum efficiency of self locking screw is :

- A. 35 %
- B. 45 %
- C. 50 %
- D. 75 %

Ans. C

82. The polar section modulus of a circular section about an axis through its centre of gravity is _____.

- A. $\frac{\pi d^3}{16}$
- B. $\frac{\pi d^3}{32}$
- C. $\frac{rd^3}{64}$
- D. $\frac{rd^2}{32}$

Ans. A

83. Work ratio obtained in a Brayton cycle is 0.64. What is the back work ratio for this cycle?

- A. 0.64
- B. 0.36
- C. 0.6
- D. 1

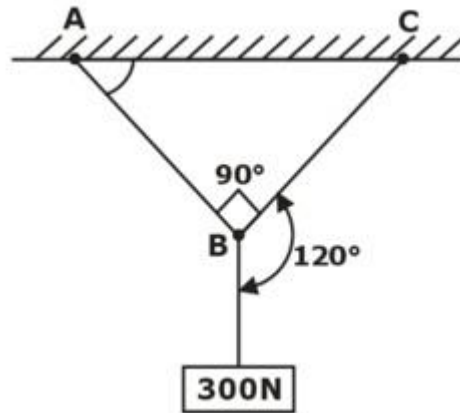
Ans. B

84. In a Vapour compression refrigeration, the desired condensing temperature for higher COP while making ice must be :

- A. Much below the critical temperature of the refrigerant
- B. Near the critical temperature of the refrigerant
- C. Above the critical temperature of the refrigerant
- D. Can of any value, as it does not affects the COP

Ans. A

85. A body of weight 300 N is being hanged by the support of two ropes as shown below:



What will be the Tensions in ropes AB and BC respectively (in N)?

- A. $T_{AB} = 260, T_{BC} = 150$
- B. $T_{AB} = 150, T_{BC} = 260$
- C. $T_{AB} = 290, T_{BC} = 130$
- D. $T_{AB} = 130, T_{BC} = 290$

Ans. A

86. Which of the following quantities is not the property of the system_____?

- A. Pressure
- B. Temperature
- C. Density
- D. Heat

Ans. D

87. Which of the following statement are correct regarding Rankine cycle?

- A. Efficiency of Rankine cycle is greater than Carnot cycle.
- B. Pump work is more in Rankine cycle than Carnot cycle.
- C. Net-work output is more in Rankine cycle than Carnot cycle.
- D. Pressure rise in pump will be same for both cycles.

Ans. C

88. The casting method best suited for ornament toys of nonferrous alloys is

- A. Die casting
- B. Investment casting
- C. Slush casting
- D. Shell mould casting

Ans. C

89. In a grinding wheel specification "51 A 36 L 5 V 23", 'V' stands for

- A. Abrasive type
- B. Grade
- C. Bond type
- D. manufacturer's symbol

Ans. C

90. Which one of the following is true about eutectoid reaction?

- A. Austenite converts to ferrite and cementite
- B. Ferrite converts to cementite and martensite
- C. Cementite converts to austenite and ferrite
- D. Martensite converts to ferrite and cementite

Ans. A

91. A dummy activity _____.
- A. is artificially introduced
 - B. is represented by a dotted line
 - C. does not consume time
 - D. all the above.

Ans. D

92. Electrochemical machining is a process widely used as a non conventional machining operation. What is the mechanism of material removal for electrochemical machining process _____?
- A. Erosion
 - B. shear
 - C. ionic dissolution
 - D. fusion and vaporisation

Ans. C

93. The distance between corresponding points on adjacent teeth measured along the direction of the axis is called _____
- A. joint line
 - B. normal link
 - C. axial pitch
 - D. lead

Ans. C

94. Case hardening is the only method suitable for hardening:
- A. High alloy steel
 - B. High carbon steel
 - C. Low carbon steel
 - D. High speed steel

Ans. C

95. The iron-carbon diagram and the TTT curves are determined under
- A. equilibrium and non-equilibrium conditions, respectively
 - B. non-equilibrium and equilibrium conditions, respectively
 - C. equilibrium conditions for both
 - D. non-equilibrium conditions for both

Ans. A

96. What is the condition involved in Grashof's law?
(where s and l are the links of shortest and longest links of the 4 bar chain respectively and p and q are the lengths of the other links)
- A. $s+l \geq p+q$
 - B. $s-l \geq p-q$
 - C. $s+l \leq p+q$
 - D. $s-l \leq p-q$

Ans. C

97. In an Otto cycle, air is compressed from 2.66 litre to 0.26 litre from an initial pressure of 1.2 kg/cm². The net output per cycle is 46.8 kJ. What is mean effective pressure of cycle _____?

- A. 225 bar
- B. 207 bar
- C. 195 bar
- D. 185 bar

Ans. C

98. Velocity for flow through a pipe, measured at the centre is found to be 2 m/s. Reynolds number is around 800. The average velocity in the pipe is ____.

- A. 2 m/s
- B. 1.7 m/s
- C. 1 m/s
- D. 0.5 m/s

Ans. C

99. Displacement thickness is 4 mm, energy thickness is 3 mm and the momentum thickness is 2 mm, the shape factor is

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

Ans. B

100. A shaft has a dimension $\Phi \begin{matrix} 25^{-0.008} \\ -0.030 \end{matrix}$. The respective value of fundamental deviation and tolerance are

- A. -0.03, ± 0.008
- B. -0.008, 0.022
- C. 0.03, ± 0.022
- D. 0.008, 0.022

Ans. B

101. Two castings A and B of the same metal are being made. Modulus of casting B is 'm' and modulus of casting A is 'n'. The ratio of solidification time of casting A to casting B is -

- A. $\frac{m}{n}$
- B. $\frac{n}{m}$
- C. $\left(\frac{m}{n}\right)^2$
- D. $\left(\frac{n}{m}\right)^2$

Ans. D

102. A large clearance volume in reciprocating compressor results in:

- A. Reduced volume flow rate
- B. Increased volume flow rate
- C. Lower suction pressure
- D. Lower delivery pressure

Ans. A

103. Peclet Number is _____.

- A. $Re \times Pr$
- B. $Nu \times Pr$
- C. Pr/Re
- D. $Nu \times Re$

Ans. A

104. Kaplan turbine is

- A. An axial flow turbine
- B. Tangential flow turbine
- C. Radial flow turbine
- D. Mixed flow turbine

Ans. A

105. Which of following process is used granular flux to cover the joint?

- A. Submerged metal arc welding (SMAW)
- B. Plasma Arc Welding (PAW)
- C. Submerged arc welding (SAW)
- D. Electroslag welding

Ans. C

106. The body will be in equilibrium if the two forces are_____.

- A. Collinear and equal
- B. Collinear and opposite
- C. Collinear, equal and opposite
- D. None of these

Ans. C

107. Which of the following is correct safe boundary for given theories

- A. Rankine's : hexagon
- B. Guest & Tresca's : square
- C. Von-Mise's : ellipse
- D. None of these

Ans. C

108. An air washer can work as a

- A. Filter only
- B. Humidifier only
- C. Dehumidifier only
- D. All of the above

Ans. D

109. Two composite bars of copper and steel, heated up to a certain temperature, then thermal stress developed in Copper and Steel bar respectively is?

- A. Compressive and tensile
- B. Tensile and compressive
- C. Both compressive
- D. Both tensile

Ans. A

110. The Independent variables in orthotropic materials are _____.

- A. 2
- B. 21
- C. 9
- D. 3

Ans. C

111. For a small scale industry, the fixed cost per month is Rs. 5000/-. The variable cost per product is Rs. 20/- and sales price is Rs. 30/- per piece. The break-even production per month will be _____.

- A. 300
- B. 460
- C. 500
- D. 10000

Ans. C

112. Which of the ideal cycle have two-isothermal and two-isobaric processes?

- A. Atkinson cycle
- B. Stirling cycle
- C. Ericsson cycle
- D. Brayton cycle

Ans. C

113. For a governor running at constant speed, what is the value of the force acting on the sleeve.

- A. Zero
- B. Variable depending upon the load
- C. Maximum
- D. Minimum

Ans. A

114. For an ideal gas, the slope of the constant volume line in the T-S diagram is.

- A. higher than the slope of the constant pressure line
- B. lower than the slope of the constant pressure line
- C. Equal to the slope of the constant pressure line
- D. Equal to the slope of the constant temperature line

Ans. A

115. In Vickers hardness test method, the shape of indenter is

- A. Square
- B. Diamond
- C. Hemisphere
- D. Any of the above three

Ans. B

116. Coefficient of discharge (C_d) for venturi meter is

- A. 0.95 – 0.99
- B. 0.61 – 0.65
- C. 0.91 – 0.95
- D. 0.8 – 0.9

Ans. A

117. The code 'M 07' in NC machining process denotes _____.

- A. Spindle start (CCW)
- B. Coolant ON
- C. Coolant OFF
- D. Spindle start (CW)

Ans. B

118. Which of the following material has highest thermal conductivity?

- A. Wood
- B. Silver
- C. Mercury
- D. Oxygen gas

Ans. B

119. In ultrasonic machining, the material removal rate changes with abrasive size as

- A. First increases then decreases
- B. Increases
- C. Decreases
- D. Constant

Ans. A

120. Which one of the following is not true about the orthogonal cutting?

- A. Cutting edge of the tool is perpendicular to the direction of cutting velocity.
- B. The cutting edge is smaller than the workpiece width.
- C. The cutting forces act along two directions only
- D. None of these

Ans. B

121. The critical temperature for water is

- A. 374.2°C
- B. 221.2°C
- C. 100°C
- D. 0°C

Ans. A

122. Which of the following equation is known as the inequality of Clausius _____.

A. $\oint \frac{dQ}{T} \leq 0$

B. $\oint \frac{dQ}{T} \geq 0$

C. $\oint \frac{dQ}{T} = 0$

D. $\oint \frac{dQ}{T} > 0$

Ans. A

123. How draught can be produced in locomotive boilers _____?

A. mechanical fan

B. chimney

C. a steam jet

D. all of the above

Ans. C

124. A jet working under air as the fuel for its thermodynamic cycle, is flying at an altitude where the air density is one - third of normally the density of air at ground level. Find the ratio of A/F at this altitude with respect to the ground.

A. $\sqrt[3]{2}$

B. 3

C. $\sqrt{\frac{1}{3}}$

D. 9

Ans. C

125. In a frame, the number of joint is 5, number of members=3, the frame is

A. Perfect

B. Redundant

C. Deficient

D. can't say

Ans. C

126. A body of mass 0.1 kg moving with a velocity of 10 ms⁻¹ hits a spring (fixed at the other end) of force constant 1000 Nm⁻¹ and comes to rest after compressing the spring. The compression of the spring is

A. 0.01 m

B. 0.1 m

C. 0.2 m

D. 0.5 m

Ans. B

127. Pitch point in cam and follower mechanism is _____.

A. A point on pitch curve of having minimum pressure angle

B. A point on pitch curve of having maximum pressure angle

C. A reference point on follower and is used to generate pitch curve

D. A reference point on follower and is used to generate prime circle

Ans. B

128. Which of the following is an example of positive clutch?

A. Plate Clutch

B. Cone Clutch

C. Centrifugal Clutch

D. Jaw Clutch

Ans. D

129. Determine the type of friction acting on the block having mass 20kg and the force applied in it 5N, if the coefficient of friction between the block and the surface is 0.3. Take $g = 10\text{m/s}^2$
- A. Static Friction
 - B. Dynamic Friction
 - C. Limiting Friction
 - D. Cannot be determined

Ans. A

130. A vessel of 10 mm diameter and 20 mm height with corner radius 0.1 mm is to be produced by cup drawing. The required blank diameter in mm is
- A. 30
 - B. 20
 - C. 10
 - D. 25

Ans. A

131. Flow of fluid through a pipe is turbulent when_____.
- A. Reynolds number is greater than 2000
 - B. Reynolds number is greater than 4000
 - C. Reynolds number is less than 2000
 - D. None of the above.

Ans. B

132. The efficiency of the Otto cycle for the same compression ratio will be maximum when working fluid is
- A. Air
 - B. Helium
 - C. Carbon Dioxide
 - D. Oxygen

Ans. B

133. Temperature profile in case of heat transfer through hollow sphere.
- A. Parabolic
 - B. Exponential
 - C. Hyperbolic
 - D. Logarithmic

Ans. C

134. The temperature to which air must be cooled at constant pressure in order to become saturated is the
- A. minimum temperature
 - B. dew point temperature
 - C. wet-bulb temperature
 - D. freezing point

View Answer

Ans. B

135. Match the following

TABLE-1	TABLE-2
P: Probability of 'n' arrivals in system during period T	$\frac{(\lambda T)^n e^{-\lambda T}}{n!}$
Q: Probability of serve a customer in more than T time	$e^{-\mu T}$
R: Probability that waiting time in queue is more than T	$\rho e^{-T/W_s}$
S: Probability that waiting time in system is more than T	e^{-T/W_s}

A. P – 2 Q – 1 R – 3 S – 4

B. P – 1 Q – 2 R – 4 S – 3

C. P – 1 Q – 2 R – 3 S – 4

D. P – 2 Q – 1 R – 4 S – 3

Ans. C

136. A Carnot engine operates between 37°C and 347°C . If the engine produces 620 kJ of work, the entropy change (in kJ/K) of working fluid during heat addition is _____.

A. 1

B. 2

C. 4

D. 0

Ans. B

137. A right circular cone of base diameter 4 mm and height 8 mm is kept inverted. What is its CG from the top?

A. 2 mm

B. 4 mm

C. 6 mm

D. None of these

Ans. A

138. In a reaction turbine the enthalpy drop in a stage is 45 units, the enthalpy drop in moving blades is 23 units. The degree of reaction is _____?

A. 0.345

B. 0.511

C. 0.682

D. 1.386

Ans. B

139. Which of the following bearing is preferred for oscillating conditions?

A. Double row ball bearing

B. Taper roller bearing

C. Angular contact single row ball bearing

D. Needle roller bearing

Ans. D

140. Collapsible tooth paste tubes are manufactured by _____.

A. Direct extrusion

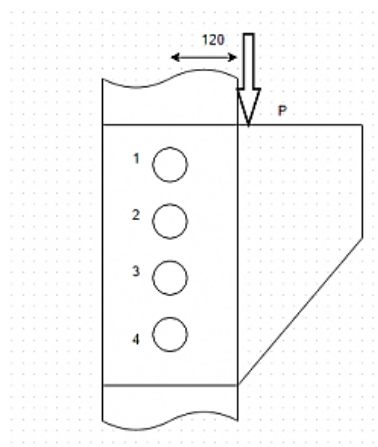
B. Piercing

C. Impact extrusion

D. Indirect extrusion

Ans. C

141. A bracket is attached to a vertical wall by means of four rivets as shown in figure below. Find the rivet which is under maximum stress.



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

Ans. A

142. In an ideal vapour compression refrigeration cycle, the enthalpy of the refrigerator before and after the evaporator are respectively 200 kJ/kg and 300 kJ/kg. The circulation rate of the refrigerant (in kg/min) for each 200 kJ/min of refrigeration is

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

Ans. B

143. 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

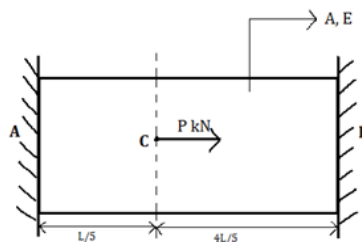
Ans. A

144. In a steady fluid flow, identical ones are_____.

- A. Path line and stream line
- B. Stream line and streak line
- C. Path line and streak line
- D. Path line, stream line and streak line

Ans. D

145. The support reactions for the prismatic bar as shown in the figure, which is supported between rigid supports, will be:



- A. $R_A = P/5$, $R_B = 4P/5$
- B. $R_A = 2P/5$, $R_B = 3P/5$
- C. $R_A = 4P/5$, $R_B = P/5$
- D. $R_A = R_B = P$

Ans. C

146. In thin cylinder the hoop stress is 200 MPa then the maximum shear stress (in plane) is equal to

- A. 100 MPa
- B. 50 MPa
- C. 200 MPa
- D. 400 MPa

Ans. B

147. A prismatic member subjected to external loading was found to increase in length by 4mm over a length of 1m and consequently its diameter was found to change by 0.002mm. If the initial diameter of the member was 5mm, then calculate the Poisson's ratio of the material.

- A. 0.30
- B. 0.15
- C. 0.23
- D. 0.10

Ans. D

148. The rated life of a ball bearing varies_____.

- A. Directly as load
- B. Inversely as square of load
- C. Inversely as cube of load
- D. Inversely as fourth power of load.

Ans. C

149. Grashoff's number is the ratio of

- A. gravitational force to viscous force
- B. viscous force to gravitational force
- C. inertial force to viscous force
- D. buoyancy force to viscous force

Ans. D

150. The kinetic energy correction factor for laminar flow in pipe closest to

- A. Less than 1
- B. lies between 1.03 to 1.06
- C. 1.33
- D. 2

Ans. D

151. A Carnot engine rejects 30% of absorbed heat at a sink at 30°C. The temperature of the heat source is _____.

- A. 100°C
- B. 433°C
- C. 737°C
- D. 1010°C

Ans. C

152. The helix angle is very small about 2°. The spring is open coiled spring _____.

- A. Yes
- B. It is closed coiled spring
- C. That small angle isn't possible
- D. None of the listed

Ans. B

153. The heat loss, without the presence of a fin is 3 W. If the efficiency and effectiveness is 0.5 and 4 respectively, what is the heat loss from the fin, keeping the entire surface at base temperature___?

- A. 6 W
- B. 24 W
- C. 12 W
- D. 8 W

Ans. B

154. Which one of the following statement is INCORRECT?

- A. In a throttling process enthalpy remains constant.
- B. The degree of freedom for the triple point of water is 0.
- C. Piston-Cylinder with valves is an example of open system.
- D. In an isolated system, the entropy can either increase, decrease or remains constant.

Ans. D

155. In an isentropic flow of air ($k=1.4$) the stagnation temperature is 600 K. If the temperature is 400 K at a section, then the Mach number of the flow will be?

- A. 1.88
- B. 1.58
- C. 2.34
- D. 2.58

Ans. B

156. An element is subjected to the following strains: $\epsilon_x = 800$, $\epsilon_y = 400$, $\gamma_{xy} = 300$, the strains are in multiple of 10^{-6} . What is the maximum shearing strain in the material (in 10^{-6}) _____?

- A. 250
- B. 750
- C. 500
- D. 1000

Ans. C

157. The natural vibration equation is $5\ddot{x} + 3x = 0$. Find ω_n

- A. $\sqrt{\frac{5}{3}}$
- B. $\sqrt{\frac{3}{5}}$
- C. $\sqrt{3}$
- D. None of these

Ans. B

158. In ABC analysis of inventories, 'A' items usually constitute: -

- A. 5%
- B. 20%
- C. 30%
- D. 70%

Ans. A

159. Which one of the following relationships defines the Helmholtz function F?

- A. $F = H + TS$
- B. $F = H - TS$
- C. $F = U - TS$
- D. $F = U + TV$

Ans. C

160. A solid cylindrical rod having the length $L = 0.15\text{m}$ and diameter $D = 0.05\text{m}$. The top and bottom surfaces of the rod are maintained at constant temperatures of 20°C and 95°C , respectively, while the side surface is perfectly insulated. If it is made of granite with $k = 1.2 \text{ W/m}\cdot^\circ\text{C}$, the rate of heat transfer through the rod is

- A. 1.05 W
- B. 1.35 W
- C. 1.50 W
- D. 1.18 W

Ans. D
