

# HAL MT 2022

## Mechanical Engineering

Sample Question Paper

### Questions & Answer Key

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

- A. Cobbler
- B. Carpenter
- C. Farmer
- D. Potter

Ans. C

2. How many pairs of letters in the word 'CHAIRS' have as many letters between them in the word as in the alphabet?

- A. 3
- B. 2
- C. 1
- D. 5

Ans. B

3. In each of the following questions, select the related word/letters /number from the given alternatives.

2, 4, 2 : 4, 16, 4 :: 1, 1, 1 : ?

- A. 2, 4, 2
- B. 1, 1, 1
- C. 2, 2, 2
- D. 2, 13, 2

Ans. B

4. Arrange the given words in the sequence in which they occur in the dictionary:

- i. Fantasy
- ii. Fanatic
- iii. Fascinate
- iv. Favourite

Select the correct answer using the codes given below:

- A. iv, ii, i, iii
- B. ii, i, iii, iv
- C. ii, iii, i, iv
- D. i, iv, ii, iii

Ans. B

5. In the following questions, find the odd number/word from the given alternatives.

Find the odd one out

- A. Animal
- B. Othello
- C. Noun
- D. Madam

Ans. C



6. At what time(in minutes after 5) between 5:30 and 6 will the hands of a clock be at right angle?

- A. 478/11
- B. 480/11
- C. 40
- D. 45

Ans. B

7. **Directions:** In each of the following questions, identify the diagram that best represents the relationship among classes given below:

M.K. Gandhi, Umesh Chandra Bandhopadhyay, Jatin Das and Surya Sen

- A. 
- B. 



Breaking all the records, the number of applications has risen this year by as many as 50%.

- A. Breaking all the records
- B. the number of applications has risen
- C. this year by as many as 50%
- D. No Error

Ans. C

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

No source of energy is so cheap as solar energy in the present age of energy crisis.

- A. No source of energy is so cheap
- B. as solar energy
- C. in the present age of energy crisis
- D. No Error

Ans. A

13. Each of the following sentences in this section has a blank space and four words or group of words are given after the sentence. Select the most appropriate word or group of words for the blank space and indicate your response to the Answer Sheet accordingly.

The deserted garden was infested \_\_\_\_\_ weeds.

- A. for
- B. into
- C. with
- D. on

Ans. C

14. **Select the most appropriate option to fill in the blank.**

The general scientific assumption is that any amount of radiation, however small, will cause genetic damage that will appear as \_\_\_\_\_ in the future.

- A. mutations
- B. disabilities
- C. diseases
- D. handicaps

Ans. A

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

"Please, take me to the officer," said the visitor.

- A. The visitor requested them to take him to the officer.
- B. The visitor told them to take him to the officer.
- C. The visitor requested for the officer to be taken.
- D. The visitor wanted the officer to take him there.

Ans. A

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

"Sunday", he said, "is the most awaited day".

- A. Sunday, he said that is the most awaited day.
- B. He said that Sunday is the most awaited day.

- C. He said that it was the most awaited day being Sunday.
- D. He said that Sunday was the most awaited day.

Ans. D

17. **Direction:** Given below is a sentence, the words of which are given in a group, in a jumbled manner. These words are numbered from 1. Identify the correct sequence of numbers from the options given. {Make sure that the reordered sentence would appeal to the reader}: to education (1)/ but is also (2)/ the cinema offers (3)/ a valuable aid (4)/ not only amusement (5)/
- A. 52143
  - B. 35241
  - C. 35412
  - D. 45132

Ans. B

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

Migrant workers can seen working on many of the building sites in New Delhi.

- A. can be seen working on
- B. can be see working on
- C. can see working
- D. No improvement

Ans. A

19. Identify the incorrect sentence:

- A. My recruitment strategies resulted in finding 10 participants.
- B. We will stop at many attractions along the way.
- C. The ability to read and analyse these records demands significant linguistic and methodological training.
- D. Building capacity, by itself, are no panacea for effective policy formulation.

Ans. D

20. **Select the most appropriate synonym of the given word.**

PLEBISCITE

- A. referendum
- B. reservation
- C. representation
- D. renunciation

Ans. A

21. Equilibrium of the monopolistic competition

- A. necessarily is profitable
- B. occurs where  $P = MC$
- C. occurs where  $MR = MC$
- D. occurs where  $P = MR$

Ans. C

22. Price theory is also known as

- A. Macro Economics
- B. Development Economics
- C. Public Economics
- D. Micro Economics

Ans. D

23. Which crop has been given cent percent (100%) Government assistance under the central government scheme "Thrust"?

- A. Wheat
- B. Rice
- C. Yellow Lentil
- D. All of These

Ans. D

24. Which of the following cities is located on the bank of Spree river?

- A. Baghdad
- B. Berlin
- C. Cairo
- D. Moscow

Ans. B

25. The Rajputana Agency included how many princely states?

- A. 17
- B. 18
- C. 19
- D. 20

Ans. D

26. Who is the author of the book 'Shahnameh'?

- A. Ibn Batuta
- B. Ferdowsi
- C. Firoz Shah
- D. Amir Khusrau

Ans. B

27. 'Mithun' is the state symbol of which of the following state of India?

- A. Andhra Pradesh
- B. Arunachal Pradesh
- C. Assam
- D. Uttarakhand

Ans. B

28. What is the responsibility of Delhi Police?

- A. Investigating crimes
- B. Protection of women
- C. Controlling criminal activities
- D. All of the above

Ans. D

29. Who was first person to sight the mainland of Antarctica?

- A. Alfred Nobel
- B. Fabian Bellinghausen
- C. Paul Muller
- D. William Roentgen

Ans. B

30. Lisp is a programming language built by whom?

- A. John McCarthy
- B. Dennis Ritchie
- C. Larry Wall
- D. Rasmus Lerdorf

Ans. A

31. Sensible heat is the heat needed to

- A. vaporize water into steam and vice versa
- B. Change the temperature of a liquid or vapour
- C. convert water into steam and superheat it
- D. measure dew point temperature

Ans. B

32. Air flows over a 10 m long plate. The transition from laminar to turbulent flow takes place between Reynolds number of  $2.5 \times 10^6$  and  $3.6 \times 10^6$ . What is the maximum distance from











- A. Carbon
- B. Austentite
- C. Martensite
- D. Pearlite

Ans. C

60. 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

61. At a point in 2D stress system  $\sigma_x = 130 \text{ N/mm}^2$ ,  $\sigma_y = \tau_{xy} = 40 \text{ N/mm}^2$ . What is the radius of the Mohr circle for stress drawn with a scale of  $1 \text{ cm} = 10 \text{ N/mm}^2$

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

Ans. D

62. The brakes applied to a car moving at 24 m/s produce an acceleration of  $6 \text{ m s}^{-2}$  in the opposite direction to the motion. If the car takes 2 s to stop after the application of brakes, the distance travelled by car is

- A. 24 m
- B. 18 m
- C. 36 m
- D. 16 m

Ans. C

63. A shaft of diameter D is subjected to a torque T. To have the angle of twist four times as that before, the percentage reduction in diameter needed is \_\_\_\_\_.

- A. 20
- B. 30
- C. 40
- D. 50

Ans. B

64. Lancashire Boiler is a

- A. Water tube boiler
- B. Fire tube boiler
- C. Locomotive boiler
- D. High pressure boiler

Ans. B

65. A heat engine receives 1000 kJ of heat and produces 600 kJ of work. The amount of heat rejected in kJ and the efficiency percentage of the engine, respectively will be

- A. 400, 40%
- B. 400, 60%
- C. 600, 40%
- D. 600, 60%

Ans. B

66. A roller contact type bearing has a rated bearing capacity of 20000 N and design load of 4000 N. The speed of the journal is 600 rpm. Determine the life of the bearing in million revolutions.

- A. 3472
- B. 987
- C. 558
- D. 213

Ans. D

67. The cycle generally used for petrol engine is:

- A. Otto cycle
- B. Dual cycle
- C. Carnot cycle
- D. Brayton cycle

Ans. A

68. Which cycle consists of two reversible isothermals and two isochoric\_\_\_\_\_?

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

Ans. C

69. Find the modulus of elasticity of a rod, which tapers uniformly from 30 mm to 15 mm diameter in a length of 300 mm. The rod is subjected to axial load of 5 kN and extension of rod is 0.022 mm.

- A.  $1.96789 \times 10^5 \text{ N/mm}^2$
- B.  $2.145 \times 10^5 \text{ N/mm}^2$
- C.  $1.92915 \times 10^5 \text{ N/mm}^2$
- D.  $1.8976 \times 10^5 \text{ N/mm}^2$

Ans. C

70. In a fillet welded joint, the weakest area of the weld is

- A. Toe
- B. Root
- C. Throat
- D. Face

Ans. C

71. An open system is one in which:

- A. Mass does not cross boundaries of the system, though energy may do so
- B. Neither mass nor energy crosses the boundaries of the system
- C. Both energy and mass cross the boundaries of the system
- D. Mass crosses the boundary but not the energy

Ans. C

72. Two involute gears in mesh have a module of 7.5 mm and pressure angle of  $20^\circ$ . The gear has 60 and pinion has 32 teeth. The ratio of sliding to the rolling velocity at the pitch point, considering addenda on pinion and gear wheel as one module, will be

- A. 0.34
- B. 0.296
- C. 0.32
- D. 0

Ans. D

73. Consider a system of two identical particles. One of the particles is at rest and the other has an acceleration  $a$ . The center of mass has an acceleration

- A. Zero
- B.  $1/2a$
- C.  $a$
- D.  $2a$

Ans. B

74. In order to facilitate the withdrawal of pattern \_\_\_\_\_

- A. Pattern is made smooth
- B. Water is applied on pattern surface
- C. Allowances are made on pattern
- D. Draft is provided on pattern

Ans. D

75. A spring mass damper system, the mass is 5 kg and undamped natural frequency is 40 Hz. What is the value of critical damping coefficient?

- A. 2514 N-s/m
- B. 2717 N-s/m
- C. 3316 N-s/m
- D. 3712 N-s/m

Ans. A

76. Which one of the following numbers represents the ratio of kinematic viscosity to the thermal diffusivity?

- A. Grashoff number
- B. Prandtl number
- C. Mach number
- D. Nusselt number

Ans. B

77. A 0.5m diameter pipe bifurcates at a Y-section into two branches 20cm and 40cm in diameter. If the rate of flow in the main pipe is  $0.6 \text{ m}^3/\text{sec}$  and through the smaller diameter pipe is  $0.25 \text{ m}^3/\text{sec}$ . Determine the velocity of flow in 40cm pipe.

- A. 6.36 m/s
- B. 1.452 m/s
- C. 2.785 m/s
- D. 2.425 m/s

Ans. C

78. A self-service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service time.

Average number of customers in the system and the average queue length, respectively, will be

- A. 9, 8.1
- B. 8.1, 9
- C. 7, 6.5
- D. 6.5, 9

Ans. A

79. In a shaping operation, one double stroke comprises of cutting stroke and return stroke. If the velocity of cutting stroke is  $12 \text{ mm}/\text{min}$ , the most probable velocity of return stroke will be

- A. 10 mm/min
- B. 6 mm/min
- C. 15 mm/min
- D. 8 mm/min

Ans. C

80. What is the shape factor of a hemispherical body placed on a flat surface with respect to itself?

- A. Zero
- B. 0.25
- C. 0.5
- D. 1.0

Ans. C

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