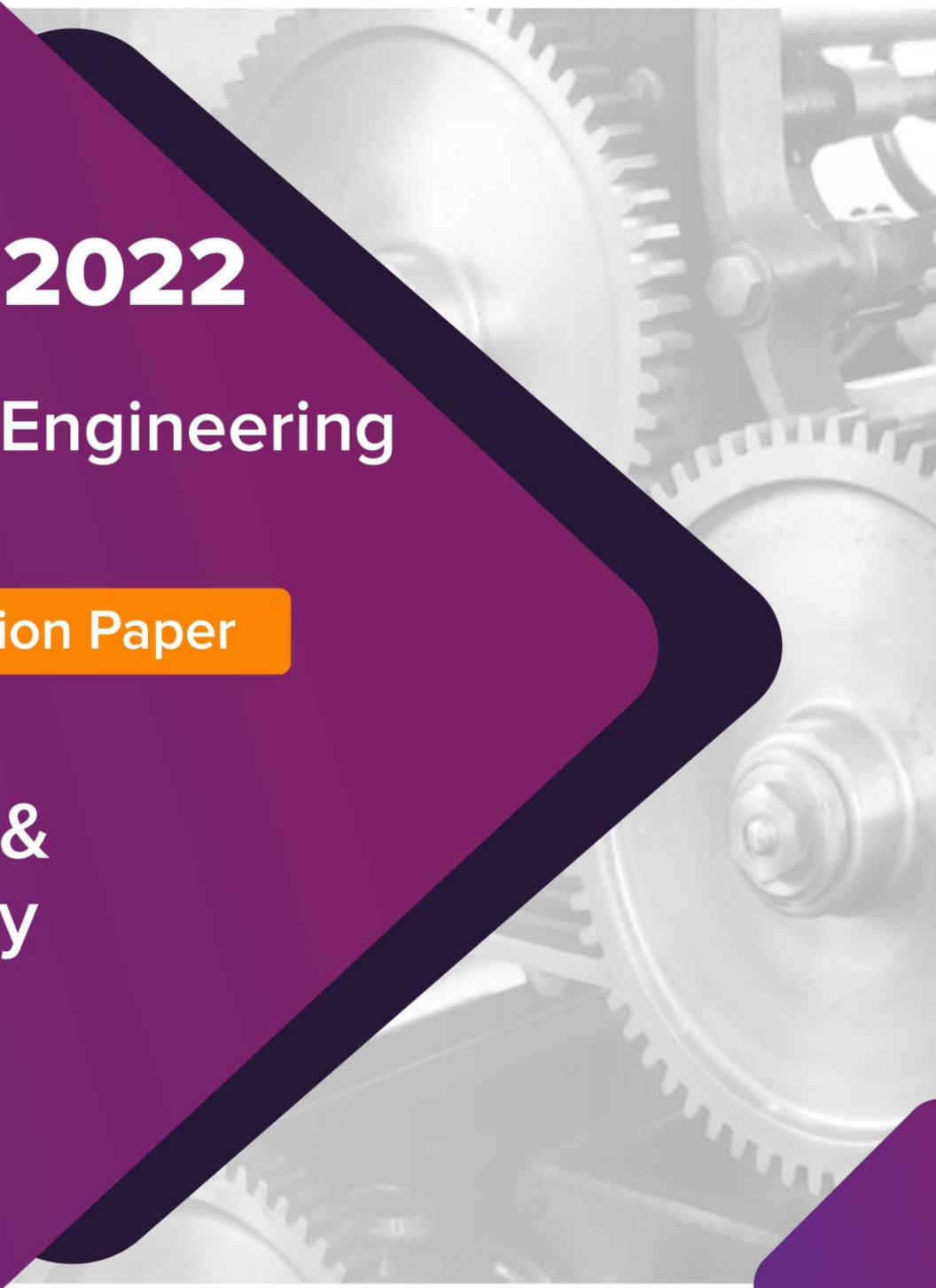
BYJU'S EXAM PREP

HAL MT 2022

Mechanical Engineering

Sample Question Paper

Questions & Answer Key



1. How many pairs of letters are there in the word COMMITTEE, each of which have as many letters between (in both forward and backward direction) them in the word as they have between then in the English alphabet?

   A. One
   B. Two
   C. More than two
   D. No one

Ans. C

2. In a certain code JOURNEY is written as TNISZFO. How is MEDICAL written in that code?

   A. CDLJMBD
   B. CDLJDBM
   C. LDCJMBD
   D. EFNJMBD

Ans. A

3. K walked 5 meters towards North, took a left turn and walked for 10 metres. He then took a right turn and walked for 20 metres, and again took a right turn and walked 10 metres. How far he is from the starting point?

   A. 20 metres
   B. 15 metres
   C. 25 metres
   D. 30 metres

Ans. C

4. **Direction:** Each of the questions below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.
   What is the Rank of Neeraj in class from bottom?
   (I) Total Number of student in class is 58?
   (II) Neeraj rank is 5 ranks above the Suresh Rank and Suresh rank is 32 on the top. A. If statements I is sufficient to answer the question, but statement II by itself is not sufficient to answer the question.
   B. If statement II by itself is sufficient to answer the question, but statement I alone is not sufficient to answer the question.
   C. If statement either I or II is sufficient to answer the question.
   D. If both the statements I and II taken together are sufficient to answer the question.

Ans. D

5. If the digits in the number '3827456' are arranged in such a way that even numbers are arranged in increasing order occupying odd places (from left to right) and odd numbers are arranged in increasing order occupying even places (from left to right). How many digits will remain at same place?

   A. None
   B. 1
   C. 2
   D. 3

Ans. A

6. In a certain code ROSE is written as #43$ and FIRST is written as 5*#37. How is STORE written in that code?

   A. 3 7 4 # $
   B. 7 3 4 # $
   C. 3 4 7 $ #
   D. 4 7 3 # $

Ans. A

7. **Direction:** In each of the questions below are given four statements followed by four conclusions numbered I, II, III and IV. You have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

Statement:

All red are white.

Some white are pink.

Some pink are yellow.

No yellow is blue.

Conclusion:

I. No blue is pink.

II. Some pink are red.

III. Some blue are red.

IV. Some blue are pink.

A. None follows
B. Only either I or IV follows
C. Only I follows
D. Only III & IV follow

Ans. B

8. **Statement:** In the city, over 75 percent of the people are living in slums and sub-standard houses which is a reflection on the housing and urban development policies of the Government.

Courses of Action:

I. There should be a separate department looking after housing and urban development.

II. The policies in regard to urban housing should be reviewed.

III. The policies regarding rural housing should also be reviewed so that such problems could be avoided in rural areas.

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

Ans. B

9. In a class of 20 students, Alisha's rank is 15^{th} from the top. Manav is 4 ranks above Alisha. What is Manav's rank from the bottom?

A. 10^{th}
B. 11^{th}
C. 9^{th}
D. 12^{th}

Ans. A

10. The next term in the sequence

1, 3, 9, 15, 25, 35, 49, ….. will be

A. 80
B. 64
C. 81
D. 63

Ans. D

11. **Direction:** Read the sentence to find out whether there is an error in it. The error, if any, will be in one part of the sentence. If the given sentence is correct as it is, mark the answer as 'No error'. Ignore the errors of punctuation if any.

There is a perception that/ the civilian authority does not/ fully appreciate the gravity of/ threats of national security.

A. There is a perception that
B. The civilian authority does not
C. Fully appreciate the gravity of
D. Threats of national security

Ans. D

12. **Direction:** Two statements with blanks have been given. These statements are followed by five alternatives. Choose the one which fits into the set of statements. |||End|||

A. He is _____ with whatever little he has.

B. They kept the _____of the communication a secret.A. Happy

B. Matter

C. Gist

D. Content

Ans. D

13. **Direction:** In the given question, a statement has been divided into five segments, each of which is denoted by (A), (B), (C), (D) and (E). Rearrange all the segments to form a coherent statement. |||End|||

A) for the average worker, however, immediately

B) a broad-based increase in wages

C) that has a much greater

D) translates into increased consumption

E) stimulating effect on the economy

A. ADECB
B. EADCB
C. DCEBA
D. BADCE

Ans. D

14. **Direction:** The following question carries a statement with four highlighted words. The words are denoted by (A), (B), (C) and (D). One of these words may either be misspelt or incorrect in the given context. Identify the incorrect word. If all of the words are correct, mark option E, 'All correct' as your answer.

The teacher liked the **poem** (A)/so much that she **asked** (B)/ Saba to read it **allowed** (C)/ to the **whole** class. (D)

A. A
B. B
C. C
D. D

Ans. C

15. **Direction:** In each question below, four words printed in bold are given. These are numbered (1), (2), (3) and (4). One of these words printed in bold may either be wrongly spelt or inappropriate in the context of the sentence. Find out the word that is inappropriate or wrongly spelt, if any. The number of that word is your answer. If all the words printed in bold are correctly spelt and appropriate in the context of the sentence then mark (5) i.e. 'All Correct', as your answer.

It **mattered**(1)/ a great **deal**(2)/ to the **actress**(3)/ what other people **taught**(4)/ of her. All correct(5)

A. (1)

B. (2)

C. (3)

D. (4)

Ans. D

16. In the following question, out of the five alternatives, select the word opposite in meaning to the given word.

Melancholy

A. Happiness

B. Sombre

C. Joyless

D. Sadist

Ans. A

17. **Direction:** In the given question, a part of the sentence is printed in bold. Below the sentence alternatives to the emboldened part are given as (A), (B), (C) and (D) which may help improve the sentence. Choose the correct alternative out of the given five options. In case the given sentence is correct, your answer will be (E), i.e., "No correction required".

My friend went **his way out** to oblige me.

i. out on his way

ii. out of his way

iii. so out of the way

A. Only I

B. Only ii

C. Only iii

D. Both ii and iii

Ans. B

18. **Direction:** In the given question, a statement divided into different segments is given. Rearrange all the segments to form a coherent statement.

P. the court has perhaps

Q. of my plea regarding submission of documents

R. in a sealed envelope

S. also taken note

A. RSQP

B. QPSR

C. PQRS

D. PSQR

Ans. D

19. **Directions:** Each question below has two blanks. There are five pairs of words below each sentence. Each pair is, numbered. Choose the pair of words which can be filled up in the blanks in the sentence in the same order so as to complete the sentence meaningfully.

The _____ terrorist was finally _____ by the police.

A. Famous, Apprehended

B. Notorious, Nabbed

C. Crafty, Admonished

D. Renowned, Caught

Ans. B

20. **Direction:** Read each sentence to find out whether there is any error in it. The error, if any, will be in one part of the sentence. If the given sentence is correct as it is, mark 'No

error' as the answer. (Ignore the errors of punctuation, if any.)
A politician fails to mention (A)/ in a campaign speech the similarities (B)/ in the positions held by him (C)/ opponent for political office and by himself. (D)/ No error (E)

A. A
B. B
C. C
D. D

Ans. C

21. The Military Literary Festival (MLF) 2018 was held in _____?

A. New Delhi
B. Pune
C. Chandigarh
D. Lucknow

Ans. C

22. The International Migrants Day (IMD) is observed on which date?

A. 20 December
B. 19 December
C. 18 December
D. 21 December

Ans. C

23. On the banks of which of the following rivers is Surat situated?

A. Narmada
B. Mahi
C. Tapti
D. Shipra

Ans. C

24. Atal tunnel, a highway tunnel, is being built between _____.

A. Jammu and Srinagar
B. Leh and Manali
C. Kullu and Manali
D. Banihal and Qazigund

Ans. B

25. Which of the following is the capital of Ethiopia?

A. Yerevan
B. Minsk
C. Phnom Penh
D. Addis Ababa

Ans. D

26. Minister of Textile Smriti Irani is elected to Rajya Sabha from which of the following states?

A. Gujarat
B. Andhra Pradesh
C. Rajasthan
D. Maharashtra

Ans. A

27. PayPal has filed a complaint against which e-commerce company in India?

A. Amazon
B. Paytm
C. PhonePe
D. Snapdeal

Ans. B

28. 'Swasthya Raksha Programme' has been launched by which union ministry?

A. Ministry of Environment, Forest and Climate Change
B. Ministry of Health and Family Welfare
C. Ministry of Drinking Water and Sanitation
D. Ministry of AYUSH

Ans. D

29. Which state has become the first Indian state to launch crop insurance claim distribution programme?

A. Madhya Pradesh
B. Uttar Pradesh
C. Himachal Pradesh
D. Punjab

Ans. A

30. Which of the following is the capital of Sudan?

A. Jeddah
B. Khartoum
C. Riyadh
D. Cairo

Ans. B

31. The normal stresses at a point are σ_x = 10 MPa, σ_y = 2 MPa, and the shear stress at this point is 3 MPa. The maximum principal stress at this point would be

A. 15 MPa
B. 13MPa
C. 11 MPa
D. 9.6 MPa

Ans. C

32. A tapering bar (diameters of end sections being d_1 and d_2) and a bar of uniform cross section 'd' have the same length and are subjected the same axial pull. Both the bars will have the same extension if 'd' is equal to

A. $\frac{d_1 + d_2}{2}$
B. $\sqrt{d_1 d_2}$
C. $\sqrt{\frac{d_1 d_2}{2}}$
D. $\sqrt{\frac{d_1 + d_2}{2}}$

Ans. B

33. A casting of size 100 x 50 x 50 cm was filled by top gates with manometric height in pouring basin to be 25 cm. find the time (in sec) to fill the casting. The area of gate is 5 square cm.

A. 225.76
B. 451.7
C. 332.8
D. 250

Ans. A

34. The gases used in TIG Welding are _____.

A. Helium & Neon
B. Argon & Helium
C. Ozone & Neon
D. Carbon dioxide & nitrogen

Ans. B

35. The strain energy per unit volume upto fracture point of the material is known as

A. Toughness
B. Hardness
C. Resilience
D. modulus of toughness

Ans. D

36. 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

37. The operation in which liquid is flown into voids by capillary action of a powder metallurgy product is known as _____.

A. Repressing
B. Impregnation
C. Infiltration
D. Sintering

Ans. C

38. Plastics bottles are made using_____.

A. Blow moulding
B. Slush casting
C. Investment casting
D. Drawing

Ans. A

39. Match the following:

List-I

A. Boiler
B. turbine
C. Condenser
D. pump

List-II

1) reversible adiabatic expansion of steam
2) constant pressure heat addition
3) reversible adiabatic compression
4) constant pressure heat rejection

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

Ans. A

40. A shaft and hole are specified as:

$\text{Hole} : 35^{+0.01}_{-0.02}$ and $\text{Shaft} : 35^{+0.03}_{+0.025}$

The size of GO plug gage is_____.

A. 34.98 mm
B. 35.01 mm
C. 35.03 mm
D. 35.025 mm

Ans. A

41. In Edge dislocation, Burgers reactor is _____.

A. Perpendicular to the dislocation line
B. Parallel to dislocation line
C. May be bar or may be parallel depending upon the extent of edge dislocation.
D. None of these

Ans. A

42. Which of the following refrigerant is inorganic refrigerants?

A. R718
B. R744
C. R729
D. All of the these

Ans. D

43. In centrifugal compressor terminology, vaneless space refers to the space between _____.

A. The inlet and blade inlet edge
B. Blades in the impeller
C. Diffuser exit and volute casing
D. Impeller tip and diffuser inlet edge

Ans. D

44. The time period of oscillation of a floating body is T. If the time period changes to 2T, the metacentric height_____.

A. Increases by a factor of 2
B. Increases by a factor of 4
C. Decreases by a factor of 2
D. Decreases by a factor of 4

Ans. D

45. The locus of a point on the pitch circle from the beginning to end of engagement of two mating gears is called as _____

A. Arc of contact
B. Path of contact
C. Path of approach
D. Arc of approach

Ans. A

46. In case of a 4-link mechanism ABCD, AB = 3 cm, BC = 4 cm, CD = 8 cm, DA = 6 cm. If CD is fixed, which mechanism will be obtained?

A. Crank-crank
B. Double Rocker
C. Crank-Rocker
D. Parallelogram linkage

Ans. B

47. In mixing chamber of AWJM, which of the following are mixed?

A. Abrasives and colloidal solution
B. Abrasives and water jet
C. Colloidal and water jet
D. None of the mentioned

Ans. B

48. In the solution of linear programming problems by simplex method for deciding the leaving variables , variables corresponding to the:

A. The maximum negative coefficient in the objective function row is selected.
B. The minimum positive ratio in the replacement ratio column is selected.
C. The maximum positive ratio in the replacement ratio column is selected.
D. None of the above.

Ans. B

49. Determine the surface tension (N/m) on a soap film of diameter 60 mm having excess pressure of $25 N/m^2$ than outside.

A. 0.375
B. 0.750
C. 0.1875
D. 0.093

Ans. C

50. In vibration isolation if ω/ω_n is less than $\sqrt{2}$ then the transmissibility will be

A. Less than one
B. Equal to one
C. Greater than one
D. Zero

Ans. C

51. A projectile is projected from ground with speed of 20 m/s at 15° with vertical. Find range

sin75° = 0.96, sin15° =0.25

A. 20m
B. 40m
C. 34.6
D. 27.33m

Ans. A

52. For a grey surface _____.

A. Reflectivity equal to 1
B. Emissivity changes with wavelength
C. Absorptivity is 1
D. Emissivity independent of wavelength

Ans. D

53. In beam of rectangular cross-section, the ratio of the maximum transverse shear stress to average shear stress at a section is_____.

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

Ans. C

54. For a turbulent flow of a pipe, the head loss is approximate_____.

(where V is mean velocity of flow)

A. directly proportional to the velocity
B. inversely proportional to the velocity
C. directly proportional to V^2
D. inversely proportional to V^2

Ans. C

55. Atomic packing factor for α- iron is –

A. 0.68
B. 0.74
C. 0.52
D. 0.34

Ans. A

56. A refrigerant operating on simple VCRS having following data

Enthalpy at outlet of condenser = 50 KJ/kg

Enthalpy at outlet of evaporator = 150 KJ/kg

Enthalpy at outlet of compressor = 175 KJ/kg

What will be the COP?

A. 3
B. 3.5
C. 4
D. 5

Ans. C

57. Materials which show direction dependent properties are called_____.

A. Homogenous
B. Viscoelastic
C. Isotropic
D. Anisotropic

Ans. D

58. The rake angle of a cutting tool is 15 °, the shear angle is 45 ° and the cutting velocity is 35 m/min. What is the velocity of chip along the tool face?

A. 28.57 m/s
B. 27.3 m/s
C. 25.3 m/s
D. 0.476 m/s

Ans. D

59. Which of the following governors does not have central load attached to their sleeves_____?

A. Porter governor
B. Watt governor
C. Proell governor
D. None of these

Ans. B

60. An electric conductor of spherical shape (thermal conductivity =300 W/m-K) is covered with a plastic insulation (thermal conductivity =1 W/m-K). The critical radius of insulation is (heat transfer coefficient = 10 W/m^2K)

A. 100 mm
B. 200 mm
C. 10 mm
D. 30 mm

Ans. B

61. If velocity potential function exists in a fluid flow, then_____.

A. Flow may or may not be rotational
B. Flow is always irrotational
C. Can't say about rotationality
D. Flow is always discontinuous

Ans. B

62. The Helmholtz function F is given by _____.

A. U – TS
B. U + TS
C. -U – TS
D. -U + TS

Ans. A

63. A time standard for a data entry clerk is to be set. A job rated at 120 % and takes 30 second to enter each records and the allowances are 15 %. What is the normal time?

A. 25 sec
B. 30 sec
C. 36 sec
D. 41.4 sec

Ans. C

64. A small element at the critical section of a component is in a biaxial state of stress with two principal stress being 30 Mpa and 20 Mpa. The maximum working stress according to distortion energy theory is

A. 25Mpa
B. 50Mpa
C. 65 Mpa
D. 26.45Mpa

Ans. D

65. A cross flow type air – heater has an area of 500 m^2. The overall heat coefficient is 100 W/m^2K and heat capacity of both hot and cold stream is 100 W/K. The value of NTU is

A. 1000 B. 500

C. 50 D. 0.2

Ans. B

66. The thermal efficiency of air standard diesel cycle with increasing cut off ratio keeping other parameters constant

A. Increases B. Decreases

C. Remain constant D. none of the above

Ans. B

67. In a rolling mill with 300 mm diameter rolls, which has the value of friction co-efficient at roll-work interface as 0.10 ; what can be the minimum possible thickness of a 4mm thick sheet to be reduced, without any change in its width?

A. 1 mm B. 2 mm

C. 3 mm D. 2.5mm

Ans. D

68. Propeller turbine is suitable for _____.

A. low head installation upto 15 m

B. high head installation above 180 m

C. medium head installations between 20 m and 180 m

D. all types of heads

Ans. A

69. The process of pushing exhausted gas-charge out of the cylinder and drawing in a fresh draught of air or air/fuel mixture for the next cycle is called _____.

A. Priming B. Knocking

C. Scavenging D. Combustion Delay

Ans. C

70. In the expression of dynamic load capacity $P=XVF_r + YF_a$, V stands for ?

A. Race rotation factor B. Radial factor

C. Thrust factor D. None of the listed

Ans. A

71. Two alternatives can produce a product. First has a fixed cost of Rs. 2000 and a variable cost of Rs. 20 per piece. The second method has a fixed cost of Rs. 1500 and a variable cost of Rs.30. The break even quantity between the two alternatives is

A. 25 B. 50

C. 75 D. 100

Ans. B

72. Two identical ball bearings P and Q are operating at loads of 30kN and 90kN respectively. The ratio of life of bearing P to the life of bearing Q is (Consider dynamic capacity is same for both bearing)

A. 27
B. 30
C. 8
D. None of these

Ans. A

73. The angular motion of a disc is given by $\theta = 4t^2 + 3t$. What will be the angular velocity (in rad./sec)at t=2 sec ?

A. 19
B. 16
C. 6
D. 21

Ans. A

74. Cotter joint is used to transmit _____.

A. Axial tensile load only
B. Axial compressive load only
C. Combined axial and twisting load only
D. Axial tensile or compressive load

Ans. D

75. 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

76. 1200kJ of heat is transferred at three different temperatures as listed below. Compare the availability at these temperatures if the dead state temperature is 300K.

a) 2000K
b) 1700K
c) 900K
d) 500K

A. b>a>c<d
B. a<b<c>d
C. a>b>c>d
D. b>c>a<d

Ans. C

77. Which one of the following statements is correct?

A. The complete conversion of low grade energy into high grade energy is impossible
B. The complete conversion of high grade energy into low grade energy is impossible
C. Heat is a high grade energy
D. Heat and work are completely interchangeable forms of energy

Ans. A

78. A fluid is flowing with an average velocity of 2m/s through a pipe of diameter 3cm.What is the maximum velocity of the fluid assuming laminar flow through the pipe?

A. 2 m/s
B. 3 m/s
C. 4 m/s
D. 6m/s

Ans. C

79. In a peritectic reaction, which of the following equation holds goods?

A. $(Solid)_1 + (Solid)_2 \rightleftharpoons (Solid)_3$

B. $(Solid)_1 + (liquid) \rightleftharpoons (Solid)_2$

C. $(Solid)_1 + (Solid)_2 \rightleftharpoons (Liquid)$

D. $(Liquid)_1 + (Liquid)_2 \rightleftharpoons (Solid)$

Ans. B

80. A machine part of mass 2 kg vibrates in viscous medium, angular frequency at resonance condition is found to be 10π rad/s. If a harmonic exciting force of 25 N produces 1.25 cm. Find the stiffness of the system (in N/m).

A. 2566 B. 1973

C. 2363 D. 2236

Ans. B

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