



PARTICULARS TO BE FILLED IN BY THE CANDIDATE		Question Booklet Number	2244948
Name of the Candidate		WBTC	
Roll Number			
Application Number			
Name of the Centre			
Centre Code		Paper Code	124
Date of the Test		Question Paper Series	D
Signature of the Candidate			

Maximum Marks : 150

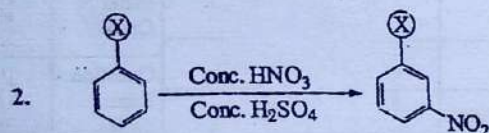
Test Duration : 03 hours

INSTRUCTIONS

- Complete all entries on the cover page and put your signature in the space provided.
 - Use only Ball Point Pen (black / blue) for making entries in the Question Booklet and the OMR Answer Sheet.
1. The Question Booklet consists of 48 pages and contains 150 questions. Count the number of pages and questions before attempting the questions. Discrepancy, if any, must immediately be brought to the notice of the Invigilator.
 2. The Test duration as specified above shall be reckoned from the moment of distribution of the Question Booklets.
 3. Blank space in the Question Booklet may be used for rough work.
 4. Each question is followed by four alternative answers. Select only one answer, which you consider as the most appropriate. Shade the relevant circle against the corresponding question number on the OMR Answer Sheet. Selecting more than one answer for a question, even if one of the selected answers is correct, would result in its being treated as an incorrect answer.
 5. Answers should ONLY be marked on the OMR Answer Sheet. No answer should be written/marked on the Question Booklet.
 6. The candidate is required to separate the original OMR Answer Sheet and its carbonless copy at the perforation carefully after the Admission Test. He / She shall handover the original OMR Answer Sheet and the Admit Card to the Invigilator before leaving his/her seat and take with him/her the carbonless copy of the OMR Answer Sheet and the Question Booklet.
 7. Failure to handover the original OMR Answer Sheet and the Admit Card will lead to cancellation of the candidature.

1. Which is not a purification technique for organic compounds?

- (a) Spectroscopy
- (b) Chromatography
- (c) Crystallisation
- (d) Distillation



What is 'X' in the above reaction?

- (a) -Cl
- (b) -OH
- (c) -NO₂
- (d) -NHR

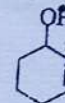
3. Which of the following undergoes Hell-Volhard-Zelinsky reaction?

- (a) CH₃CH₂COOH
- (b) CCl₃COOH
- (c) C₆H₅COOH
- (d) (CH₃)₃CCOOH

4. Which one of the following conformations of cyclohexane is the least stable?

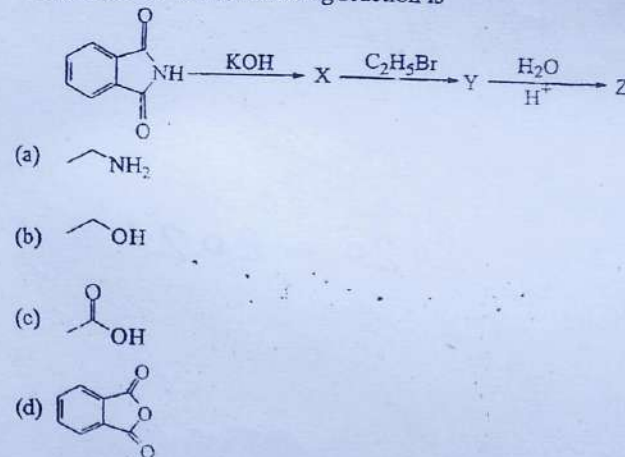
- (a) Half-chair
- (b) Boat
- (c) Twisted-boat
- (d) Chair

5. IUPAC name of the following compound is



- (a) 3-Hydroxy cyclohexene
- (b) Cyclohex-2-en-1-ol
- (c) Cyclohex-5-en-1-ol
- (d) Cyclohex-1-en-3-ol

6. The product 'Z' in the following reaction is



In a constant volume calorimeter (bomb calorimeter), 10.5 gm of C_2H_4 gas was burnt in excess of oxygen at 300 K. The temperature of the calorimeter was found to increase from 300 K to 300.50 K due to combustion process (given that heat capacity of the calorimeter is 10.5 kcal / K). What is the heat of combustion of the gas? (Consider $R = 2 \text{ cal / mol.K}$)

- (a) - 14 kcal / mol
- (b) - 14.6 kcal / mol
- (c) - 15.2 kcal / mol
- (d) - 12.8 kcal / mol

5.6 dm³ of an unknown gas at STP requires 50.0 J of heat to raise its temperature by 10°C at constant volume. The atomicity of gas is : ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

- (a) 1.71
- (b) 1.83
- (c) 1.415
- (d) 1.09

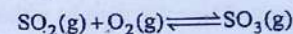
9. When 1 gm liquid naphthalene [$C_{10}H_8$] solidifies, 100 J heat is evolved. Calculate the enthalpy of solidification of naphthalene

- (a) - 128 kJ / mol
- (b) - 1.28 kJ / mol
- (c) + 12.8 kJ / mol
- (d) - 12.8 kJ / mol

10. Ammonium hydrogen sulphide [$NH_4HS(s)$] dissociates to $NH_3(g)$ and $H_2S(g)$. If the observed pressure at equilibrium is 3.0 atm at 380 K, the equilibrium constant, K_p of the reaction is

- (a) 3.0
- (b) 1.5
- (c) 2.25
- (d) 4.5

11. A mixture of SO_3 , SO_2 and O_2 gases are present in a 10 litre flask at a temperature at which $K_c = 100$ for the reaction,



If the number of moles of SO_3 in the flask is twice the number of moles of SO_2 . The number of moles of oxygen present are

- (a) 0.04
- (b) 0.40
- (c) 0.025
- (d) 0.60

12. A compound is formed by two elements M and N. The element M form CCP and atoms of N occupy 2/3 of the tetrahedral voids. What is the formula of the compound?

- (a) M_3N_3
- (b) M_3N_4
- (c) M_4N_3
- (d) M_3N_2

13. Time taken for a zero order reaction to complete $3/4^{\text{th}}$ of the reaction is

- (a) $t_{3/4} = 1.5 t_{1/2}$
- (b) $t_{3/4} = \frac{2}{3} t_{1/2}$
- (c) $t_{3/4} = \frac{3}{4} t_{1/2}$
- (d) $t_{3/4} = 0.5 t_{1/2}$

14. If $E_{Fe^{3+}/Fe}^0$ and $E_{Fe^{2+}/Fe}^0$ are -0.44 V and 0.77 V, respectively. The $E_{Fe^{2+}/Fe}^0$ will be

- (a) 0.40 V
- (b) 0.11 V
- (c) 0.33 V
- (d) 0.04 V

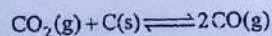
15. A steam engine operates between 500 K and 300 K under high pressure. What is the minimum amount of heat that must be withdrawn from heat reservoir to obtain 500 Joule of work?

(a) 200 Joule
(b) 1250 Joule
(c) 2000 Joule
(d) 1000 Joule

16. A non-ideal solution of component A and B show positive deviation from Raoult's law. For this mixture :

(a) $\Delta H_{\text{mix}} > 0$ and $\Delta V_{\text{mix}} > 0$
(b) $\Delta H_{\text{mix}} < 0$ and $\Delta V_{\text{mix}} < 0$
(c) $\Delta H_{\text{mix}} = 0$ and $\Delta V_{\text{mix}} = 0$
(d) $\Delta H_{\text{mix}} = 0$ and $\Delta V_{\text{mix}} > 0$

17. CO_2 upon heating with carbon at high temperature is reduced to carbon monoxide :



K_p for the reaction is 1.90 atm. The total pressure at equilibrium was found to be 2.0 atm. What are the partial pressures of CO_2 and CO ?

(a) 0.78 atm, 1.22 atm
(b) 1.22 atm, 0.78 atm
(c) 0.88 atm, 1.12 atm
(d) 0.92 atm, 1.36 atm

18. Which of the following is correct statement?

(a) BeSO_4 is insoluble but BeO is soluble in water.
(b) KI is more soluble than LiI in ethanol.
(c) KO_2 is diamagnetic.
(d) BaO is soluble but BaSO_4 is insoluble in water.

19. When 30.0 g of a non-volatile solute having the general molecular formula $\text{C}_n \text{H}_{2n} \text{O}_n$ is dissolved in 1.0 kg of water, the solution freezes at -0.93°C .

What will be the value of n in the formula?
(given that for water $K_f = 1.86 \text{ K kg mol}^{-1}$)

(a) 1
(b) 2
(c) 3
(d) 1.5

20. The rearrangement of methyl isonitrile (CH_3NC) to acetonitrile (CH_3CN) is a first-order reaction and has a rate constant of $5.11 \times 10^{-5} \text{ s}^{-1}$ at 472 K.



If the initial concentration of CH_3NC is 0.0340 M, what is the molarity of CH_3NC after 2.00 hr?

(a) 0.003749 M
(b) 0.0435 M
(c) $e^{-3.749} \text{ M}$
(d) $e^{-0.0435} \text{ M}$

21. The molal freezing point depression constant for benzene (C_6H_6) is $4.90 \text{ K kg mol}^{-1}$. Selenium exists as a polymer of the type Se_x . When 3.26 g of selenium is dissolved in 226 g of benzene, the observed freezing point is 0.112°C lower than that of pure benzene. The molecular formula of selenium is (Atomic mass of $\text{Se} = 78.8 \text{ g mol}^{-1}$) :

(a) Se_4
(b) Se_2
(c) Se_6
(d) Se_8

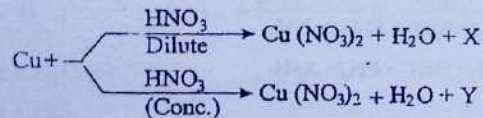
22. H_2S is passed into one dm^3 of a solution containing 0.1 mole of Zn^{2+} and 0.01 mole of Cu^{2+} till the sulphide ion concentration reaches 8.1×10^{-19} moles. Which one of the following statements is true? [K_{sp} of ZnS and CuS are : 3×10^{-22} and 8×10^{-36} , respectively]

- (a) Only CuS precipitates
- (b) Only ZnS precipitates
- (c) Both CuS and ZnS precipitates
- (d) No precipitation occurs

23. The IUPAC name of the coordination complex $[PdI_2(NO_2)_2(H_2O)_2]$ is :

- (a) Dihydroxodiaquaidonitrito-N-palladium (IV)
- (b) Dihydroxodiiodonitrito-N-palladium (IV)
- (c) Diaquadiiodonitrito-O-palladium (IV)
- (d) Diaquadiiodonitrito-N-palladium (IV)

24. Identify X and Y in the following reaction



- (a) X is NO but Y is NO_2
- (b) X is NO_2 but Y is NO
- (c) X is N_2O but Y is N_2O_4
- (d) X is NO_2 but Y is N_2O

25. The complex similar to glucose solution towards electrical conductance is :

- (a) $[Cr(H_2O)_6]Cl_3$
- (b) $[Co(NH_3)_4Cl_2]Cl$
- (c) $[Co(NH_3)_3Cl_3]$
- (d) $[Cr(H_2O)_5Cl]Cl_2$

26. How many phosphorous oxygen bonds are present in cyclotrimetaphosphoric acid ?

- (a) 12
- (b) 9
- (c) 6
- (d) 4

27. The vapour phase refining of nickel is done by :

- (a) Van Arkel method
- (b) Mond process
- (c) Hall-Heroult process
- (d) None of the above

28. Which of the following elements of group 15 has the least tendency to exhibit -3 oxidation state?

- (a) P
- (b) Bi
- (c) Sb
- (d) As

29. Which of the following statements is incorrect for nitrogen?

- (a) Exhibits oxidation state from +1 to +4.
- (b) Exhibits unique ability to form $p\pi - p\pi$ multiple bonds.
- (c) Exhibits inert-pair effect.
- (d) Exhibits maximum tendency for -3 oxidation state.

30. Which of the following oxides of group 15 show purely acidic character?

- (a) N_2O_3
- (b) As_2O_3
- (c) Sb_2O_3
- (d) Bi_2O_3

31. The oxidation state of antimony in zinc antimonide is :

- (a) +4
- (b) -3
- (c) -1
- ☒ (d) +3

32. A decrease in the electronegativity in group 16 down the group implies :

- (a) A decrease in atomic size / radii.
- (b) An increase in ionization enthalpy.
- (c) An increase in metallic character.
- ☒ (d) None of the above.

33. When PCl_5 is changed to PCl_6^- ion, the d-orbital involved in sp^3d^2 hybridization of P is :

- (a) $\text{d}_{x^2-y^2}$
- (b) d_{xy}
- (c) d_{z^2}
- ☒ (d) d_{xz} or d_{yz}

34. Which of the following species is not paramagnetic ?

- (a) O_2
- (b) S_2
- (c) S_2^+
- ☒ (d) O_2^{2+}

35. Which of the following conditions does not apply to large scale manufacture of ammonia by Haber's process?

- (a) High Pressure
- (b) Use of Iron oxide as catalyst
- (c) Use of small amount of K_2O and Al_2O_3
- ☒ (d) Low temperature

36. Which form of sulphur dioxide decolourises acidified KMnO_4 ?

- ☒ (a) Gaseous SO_2
- (b) Liquid SO_2
- (c) Aqueous SO_2
- (d) None of the above

37. The correct order of boiling points of hydrides of group 15 elements is :

- (a) $\text{BiH}_3 > \text{SbH}_3 > \text{NH}_3 > \text{AsH}_3 > \text{PH}_3$
- ☒ (b) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3 > \text{BiH}_3$
- (c) $\text{PH}_3 > \text{AsH}_3 > \text{BiH}_3 > \text{SbH}_3 > \text{NH}_3$
- (d) $\text{SbH}_3 > \text{NH}_3 > \text{BiH}_3 > \text{PH}_3 > \text{AsH}_3$

38. The zinc ore sphalerite has the composition :





- (a) ZnO
- (b) ZnCO_3
- (c) ZnS
- (d) $\text{Zn}(\text{OH})_2$

39. Zone refining process can not be applied for the metal :

- (a) Germanium
- (b) Gallium
- (c) Indium
- (d) Aluminium



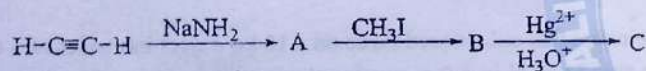
40. The maximum number of hyperconjugating structures are shown by

- (a) 
- (b) 
- (c) 
- (d) 

41. Which of the following has the highest nucleophilicity?

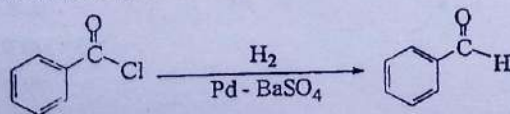
- (a) F^-
- (b) H_3C^-
- (c) HO^-
- (d) H_2N^-

42. The final product in the following sequence of reactions is

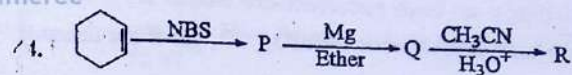


- (a) CH_3CH_2CHO
- (b) CH_3CHO
- (c) CH_3CH_2COOH
- (d) CH_3COCH_3

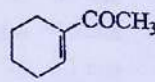
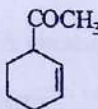
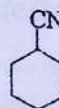
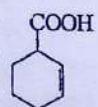
43. The name of the following reaction is



- (a) Etard Reaction
- (b) Stephen Reaction
- (c) Rosenmund Reaction
- (d) Gattermann - Koch Reaction



Product 'R' is

- (a) 
- (b) 
- (c) 
- (d) 

45. Which enzyme converts glucose and fructose into ethanol?

- (a) Diastase
- (b) Invertase
- (c) Zymase
- (d) Maltase

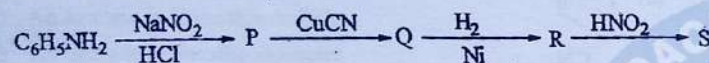
46. The most reactive compound towards S_N2 displacement reaction :

- (a) 1-Bromobutane
- (b) 1-Bromo-2, 2-dimethylpropane
- (c) 1-Bromo-2-methylbutane
- (d) 1-Bromo-3-methylbutane

47. When an acid 'X' is treated with aqueous NaHCO_3 , CO_2 gas is not liberated. What is 'X'?

- (a) Benzoic acid
- (b) Picric acid
- (c) Lactic acid
- (d) Oxalic acid

48. Identify 'S' in the following :



- (a) $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$
- (b) $\text{C}_6\text{H}_5\text{NHCH}_2\text{CH}_3$
- (c) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
- (d) $\text{C}_6\text{H}_5\text{NHOH}$

49. Heroin is a derivative of

- (a) Cocaine
- (b) Morphine
- (c) Caffeine
- (d) Nicotine

50. The base present in DNA, but not in RNA is

- (a) Adenine
- (b) Guanine
- (c) Thymine
- (d) Uracil

51. A carrier wave of peak voltage 15 V is used to transmit a message signal. Find the peak voltage of the modulating signal in order to have a modulation index of 65%.

- (a) 5.7 V
- (b) 6.3 V
- (c) 9.7 V
- (d) 11.2 V

52. A beam of light consisting of two wave lengths, 650 nm and 520 nm, is used to obtain interference fringes in a Young's double slit experiment. What is the least distance from the central maximum where the bright fringes due to both the wave lengths coincide?

- (a) 0.83 mm
- (b) 1.23 mm
- (c) 1.56 mm
- (d) 1.71 mm

53. The magnitude of an unbalanced force on a 10 kg object increases at a constant rate from zero to 50 N in 4.0 s, causing the initially stationary object to move. What is the object's speed at the end of 4.0 s?

- (a) 10 m/s
- (b) 15 m/s
- (c) 20 m/s
- (d) 25 m/s

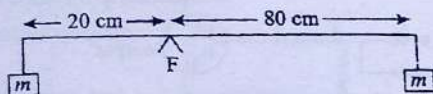
$$s = \frac{D}{T} \times 10^5$$

$$f = \frac{10}{4 \times 10^{-4}}$$

$$50 = \frac{5}{2}$$



54. Two blocks, each of mass m , are suspended from the ends of a rigid massless rod (as shown). The rod is held horizontally on the fulcrum F and then released. What is the magnitude of the initial acceleration of the block closer to F ?



$$A = 9 \text{ m/s}^2$$

$$\frac{9/8}{1600}$$

$$\frac{9/8}{1600}$$

$$\frac{2\pi}{2 \times \frac{22}{7} (8)^2}$$

$$\frac{22}{7}$$

$$\frac{2 \times 10^8}{1 \times 10^8}$$

55. A hollow sphere of inner radius 8 cm and outer radius 9 cm floats half-submerged in a liquid of density 800 kg/m^3 . Find the density of the material of the sphere.

- (a) 800 kg/m^3
(b) 1000 kg/m^3
(c) 1300 kg/m^3
(d) 1400 kg/m^3

56. In an accelerator, protons move along a circular path of diameter 23 m in an evacuated chamber, whose residual gas is at 295 K and 1.0×10^{-6} torr pressure. Find the mean free path of the gas molecules if the molecular diameter is 2.0×10^{-8} cm.

- (a) 0.8 m
(b) 10 m
(c) 86 m
(d) 172 m

57. An infinite non-conducting sheet has a surface charge density $0.10 \text{ } \mu\text{C/m}^2$ on one side. How far apart are equipotential surfaces whose potentials differ by 50 V?

- (a) 8.8 mm
(b) 6.5 mm
(c) 4.6 mm
(d) 3.1 mm

58. A circular loop of wire having a radius of 8 cm carries a current of 0.20 A.

A unit vector parallel to the dipole moment $\vec{\mu}$ of the loop is given by $(0.6\hat{i} - 0.8\hat{j})$. If the loop is located in a uniform magnetic field

$\vec{B} = (0.25 \text{ T})\hat{i} + (0.30 \text{ T})\hat{k}$, find the magnetic potential energy of the loop.

- (a) $-6.0 \times 10^{-4} \text{ J}$
(b) $6.0 \times 10^{-4} \text{ J}$
(c) $-8.0 \times 10^{-5} \text{ J}$
(d) $8.0 \times 10^{-5} \text{ J}$

59. Two electrons in lithium ($Z = 3$) have the quantum numbers $n = 1, l = 0, m_l = 0, m_s = \pm \frac{1}{2}$. What quantum numbers can the third electron have if the atom is to be in its ground state?

- (a) $(1, 0, 0, \pm \frac{1}{2})$
(b) $(2, 1, 0, \pm \frac{1}{2})$
(c) $(2, 0, 0, \pm \frac{1}{2})$
(d) $(2, 1, 1, \pm \frac{1}{2})$

60. Which of the following fusion reactions will not result in the net release of energy?

- (a) ${}^6\text{Li} + {}^6\text{Li}$
- (b) ${}^{12}\text{C} + {}^{12}\text{C}$
- (c) ${}^{20}\text{Ne} + {}^{20}\text{Ne}$
- (d) ${}^{35}\text{Cl} + {}^{35}\text{Cl}$

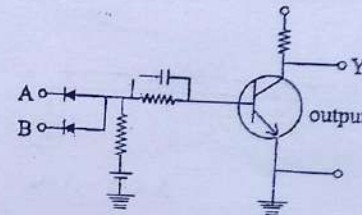
61. At what rate is hydrogen being consumed in the core of the sun by the p-p cycle? (Given; 26.2 MeV of thermal energy is produced when 4 protons are consumed; Power of the sun = 3.9×10^{26} W)

- (a) 6.2×10^{11} kg/s
- (b) 3.9×10^{10} kg/s
- (c) 1.6×10^9 kg/s
- (d) 0.6×10^8 kg/s

62. What is the probability that a quantum state whose energy is 0.10 eV above the Fermi energy will be occupied? Take a sample temperature of 800 K.

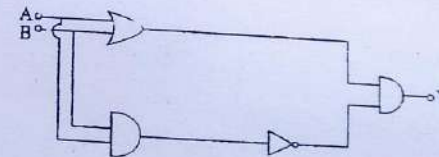
- (a) ~ 5%
- (b) ~ 10%
- (c) ~ 20%
- (d) ~ 30%

63. Which logic gate is achieved in the following circuit?



- (a) OR
- (b) NOT
- (c) AND
- (d) NAND

64. The Boolean expression for the following logic gate is :



- (a) $Y = (A + B) (\overline{AB})$
- (b) $Y = A\overline{B} + \overline{B}A$
- (c) $Y = (\overline{A+B}) (AB)$
- (d) $Y = \overline{AB}$

65. Which of the following has the dimensional formula $ML^{-1}T^{-1}$?

- (a) Surface tension
- ☒ (b) Thermal conductivity
- (c) Universal constant of gravitation
- (d) Coefficient of viscosity

66. A particle starts from rest and is moving with a constant acceleration. After 10 s, the speed is found to be 100 m/s and one second later the speed becomes 150 m/s. Find the distance travelled during 11th second.

- (a) 96 m
- (b) 125 m
- (c) 145 m
- (d) 162 m

$$T = 10 \text{ s}$$

$$S = 100 \text{ m/s}, 150 \text{ m/s}$$

$$S = \frac{v}{T} \quad D = S \times T$$

$$150 \times 11 = 1650$$

67. The range of a projectile projected at an angle of 15° is 50 m. If it is projected with the same speed at an angle of 45° , its range will be

- (a) 30 m
- (b) 50 m
- (c) 70 m
- (d) 100 m

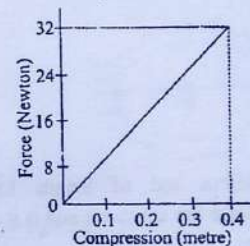
68. A particle of mass 10 gram is moving under the influence of a force $(5\hat{i} + 2.5\hat{j})\text{N}$. If the particle starts from rest, find its position at time $t = 5\text{s}$.

- (a) $(6250\hat{i} + 3125\hat{j})\text{m}$
- (b) $(3125\hat{i} + 6250\hat{j})\text{m}$
- (c) $(12500\hat{i} + 6250\hat{j})\text{m}$
- (d) $(6250\hat{i} + 12500\hat{j})\text{m}$

69. The average mass of a rain drop is $3 \times 10^{-5} \text{ kg}$ and its terminal velocity is 9 m/s. Find the energy transferred by rain to each square metre of the surface at a place which receives 100 cm of rain in a year.

- (a) $1.09 \times 10^2 \text{ J}$
- (b) $2.3 \times 10^3 \text{ J}$
- (c) $4.1 \times 10^4 \text{ J}$
- (d) $5.5 \times 10^5 \text{ J}$

70. Figure shows a force-compression curve of a spring. A body of mass 5.0 kg moving with a velocity of 8 m/s hits the spring. Find the compression produced in the spring when the body hits it.

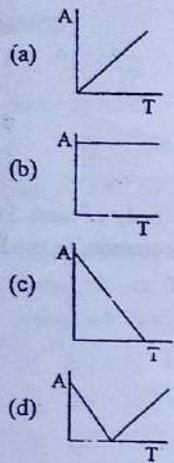


- (a) 2 m
- ☒ (b) 1.8 m
- (c) 1.4 m
- (d) 0.8 m

A body of mass 0.5 kg moves along X-axis with velocity $v = ax^{3/2}$, where $a = 5 \text{ m}^{-1/2} \text{ s}^{-1}$. Find the work done by the net force during its displacement from $x = 0$ to $x = 2\text{m}$.

- (a) 20 J
- (b) 30 J
- (c) 40 J
- (d) 50 J

72. Which of the following represents the areal velocity (A) versus time (T) graph for a planet?



73. The density of a non-uniform rod of length 1.0 m is given by $\rho(x) = a(1 + bx^2)$, where a and b are constants and $0 \leq x \leq 1$. The centre of mass (c.m.) of the rod will be at

- (a) $\frac{3(2+b)}{4(3+b)}$
 (b) $\frac{4(2+b)}{3(3+b)}$
 (c) $\frac{3(3+b)}{4(2+b)}$
 (d) $\frac{4(3+b)}{3(2+b)}$

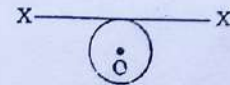
74. Which of the following statements is not correct?

- (a) During rolling, the force of friction acts in the same direction as the direction of motion of the centre of mass of the body.
 (b) The instantaneous speed of the point of contact during rolling is zero.
 (c) The instantaneous acceleration of the point of contact during rolling is zero.
 (d) For perfect rolling motion, work done against friction is zero.

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75. A thin wire of length L and uniform linear mass density ρ is bent into a circular loop (as shown). The moment of inertia of the loop about the axis XX' is :



- (a) $\frac{\rho L^3}{8\pi^2}$
 (b) $\frac{\rho L^3}{16\pi^2}$
 (c) $\frac{5\rho L^3}{16\pi^2}$
 (d) $\frac{3\rho L^3}{8\pi^2}$

76. A body of mass m is projected at an angle θ with X-axis, with an initial speed v_0 in X-Y plane. At the time $t = \frac{v_0 \sin \theta}{g}$, the angular momentum of the body is

- (a) $\frac{1}{2} mg v_0 t^2 \cos \theta \hat{i}$
 (b) $-mg v_0 t^2 \cos \theta \hat{j}$
 (c) $mg v_0 t \cos \theta \hat{k}$
 (d) $-\frac{1}{2} mg v_0 t^2 \cos \theta \hat{k}$

77. Which of the following is not correct for artificial satellites?

- (a) They are used to study different regions of atmosphere.
 (b) They are used for information about weather forecast.
 (c) They are not used to study the shape of the planets.
 (d) They are used to study the radiations coming from sun and outer space.

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78. On taking a solid ball from the surface to the bottom of a lake of 200 m depth, the volume of the ball is reduced by 0.1%. Find the bulk modulus of the material of the ball.

(a) $2 \times 10^7 \text{ N/m}^2$
 (b) $1.6 \times 10^8 \text{ N/m}^2$
 (c) $2.0 \times 10^9 \text{ N/m}^2$
 (d) $0.6 \times 10^{10} \text{ N/m}^2$

79. Two plates, each of cross-sectional area A , have thicknesses L and $2L$ and thermal conductivities K and $2K$, respectively, are joined to form a single plate of thickness $3L$. If the temperatures of the free surfaces are T_1 and T_2 , what is their equivalent thermal conductivity?

(a) $3K$
 (b) K
 (c) $K/2$
 (d) $3K/2$

80. The work of 146 kJ is performed in order to compress 1.0 kilomole of a gas adiabatically and in this process the temperature of the gas increases by 7°C . The gas is

(a) diatomic
 (b) triatomic
 (c) a mixture of monoatomic and diatomic
 (d) monoatomic

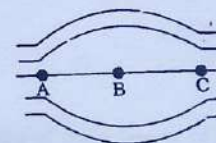
81. A particle free to move along the X -axis has potential energy given by $U(x) = K[1 - e^{-x^2}]$; $-\infty < x < \infty$. What is the nature of oscillation for small displacements near $x = 0$?

(a) SHM
 (b) non-periodic
 (c) periodic but not SHM
 (d) none of these

82. The fundamental frequency of a 1.5 m long stretched steel wire is 175 Hz. Find the percentage change in the frequency of wire if tension in the wire is increased by 3%. (Density of steel = $7.8 \times 10^3 \text{ kg/m}^3$)

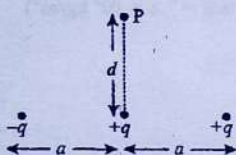
(a) 0.8 %
 (b) 1.5 %
 (c) 2.1 %
 (d) 3.0 %

83. Figure shows some electric field lines corresponding to an electric field. If E_A , E_B and E_C are the electric field intensities at points A, B and C respectively, then

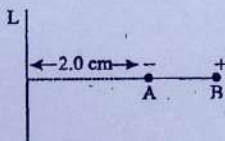


(a) $E_A > E_B > E_C$
 (b) $E_A = E_B = E_C$
 (c) $E_A = E_C > E_B$
 (d) $E_A = E_C < E_B$

84. The magnitude of the electric field at the point P in the configuration (as shown) for $d \gg a$ is



- (a) $\frac{q}{4\pi\epsilon_0 d^3}$
 (b) $\frac{2qa}{4\pi\epsilon_0 d^3}$
 (c) $\frac{q}{4\pi\epsilon_0 d^3} \sqrt{d^2 + 4a^2}$
 (d) $\frac{q}{4\pi\epsilon_0 d^3} \sqrt{4d^2 + a^2}$
85. As shown, L is a long line charge of linear charge density $4.0 \times 10^{-4} \text{ C/m}$, and AB is an electric dipole consists of charges $\pm 2.0 \times 10^{-8} \text{ C}$ separated by a distance of $2.0 \times 10^{-3} \text{ m}$. Find the force acting on the dipole.



- (a) 0.6 N towards L
 (b) 0.6 N away from L
 (c) 0.8 N towards L
 (d) 0.8 N away from L

86. Suppose the four coloured-bands on the resistor are brown, yellow, green and gold as read from left to right. The value of the resistance is :

- (a) $(1.4 \pm 0.07) \text{ M}\Omega$
 (b) $(1.2 \pm 0.05) \text{ M}\Omega$
 (c) $(1.1 \pm 0.03) \text{ M}\Omega$
 (d) $(1.0 \pm 0.06) \text{ M}\Omega$

87. In an electric circuit, a resistor develops 200 J of thermal energy in 5.0 s when a current of 1.0 A is passed through it. If the current is increased to 3.0 A, what will be the energy developed in 5.0 s?

- (a) 800 J
 (b) 1200 J
 (c) 1600 J
 (d) 1800 J

88. A $10.0 \mu\text{F}$ capacitor having a charge of $40 \mu\text{C}$ is discharged through a wire of resistance 2.5Ω . The heat dissipated in the wire between 25 to 50 μs is (Given, $e^{-1} = 0.37$)

- (a) 4.7 μJ
 (b) 9.4 μJ
 (c) 12.6 μJ
 (d) 14.2 μJ

89. Which of the following properties corresponds to diamagnetic substances?

- (a) Magnetic susceptibility is a small but positive quantity.
 (b) The relative permeability is slightly more than 1.
 (c) Magnetic susceptibility is a small but negative quantity.
 (d) The relative permeability is of the order of thousands.

$A = 2 \times 10^{-20} \text{ J}$
 $h = \frac{W}{f} = \frac{W}{\frac{c}{\lambda}}$

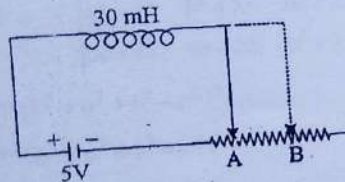
Radiation corresponding to the transition $n = 4$ to $n = 2$ in H-atom falls on a metallic surface whose work function is 1.9 eV. What is the maximum kinetic energy of the photoelectrons?

- (a) 0.35 eV
(b) 0.43 eV
(c) 0.51 eV
(d) 0.65 eV

1. Which of the following relations is correct between the frequencies $\nu_{K\beta}$, $\nu_{K\alpha}$ and $\nu_{L\alpha}$ of $K\beta$, $K\alpha$ and $L\alpha$ X-rays, respectively, of the same material?

- (a) $\nu_{K\beta} = \nu_{K\alpha} + \nu_{L\alpha}$
(b) $\nu_{L\alpha} = \nu_{K\beta} + \nu_{K\alpha}$
(c) $\nu_{K\beta} = \nu_{K\alpha} - \nu_{L\alpha}$
(d) $\nu_{L\alpha} = (\nu_{K\alpha} + \nu_{K\beta})/2$

92. In the following circuit, the sliding contact A may be pulled towards right. If the resistance in the circuit is 10.0Ω when the sliding contact was at A, then the current (i) for the sliding contact at B will be :



- (a) $i = 0.5 \text{ A}$
(b) $i < 0.5 \text{ A}$
(c) $i > 0.5 \text{ A}$
(d) $i = 0$

$i = \frac{V}{R} = \frac{5}{10} = 0.5 \text{ A}$
 $i = 0$

93. An inductance coil stores 20 J of magnetic field energy and dissipates energy as heat at the rate of 200 W when a current of 2 A is passed through it. What is the time constant of the circuit when this inductance coil is joined across an ideal battery?

- (a) 0.5 s
(b) 0.3 s
(c) 0.2 s
(d) 0.10 s

94. The energy stored in 90 cm length of a laser beam operating at 3 mW is :

- (a) $3 \times 10^{-10} \text{ J}$
(b) $6 \times 10^{-11} \text{ J}$
(c) $9 \times 10^{-12} \text{ J}$
(d) $1.2 \times 10^{-14} \text{ J}$

95. After absorbing a photon of wave length 242 nm, a moving hydrogen atom stops. Find the speed of hydrogen atom.

- (a) 1.6 m/s
(b) 2.4 m/s
(c) 3.4 m/s
(d) 4.9 m/s

96. Find the energy needed to remove the electron from a hydrogen-like atom, if its excitation energy in the first excited state is 41 eV.

- (a) 48 eV
(b) 54 eV
(c) 61 eV
(d) 70 eV

97. In which of the following mass number regions, the nuclei are most stable?

- (a) $2 < A < 12$
- (b) $16 < A < 40$
- (c) $50 < A < 80$
- (d) $100 < A < 240$

98. Which of the following properties cannot be related to α -rays?

- (a) Its penetrating power is low
- (b) α -rays coming from radioactive materials travel at 10^6 m/s
- (c) α -ray cannot produce scintillation when it strikes fluorescent material
- (d) It causes ionization in gases

99. For a light of wave length 6000 \AA , coming from a distant star, what is the limit of resolution of a telescope whose objective has a diameter of 200 inch.

- (a) 1.4×10^{-7} rad
- (b) 2.9×10^{-7} rad
- (c) 3.6×10^{-8} rad
- (d) 4.5×10^{-8} rad

100. The Zener diode can be used as

- (a) a half-wave rectifier
- (b) a full-wave rectifier
- (c) a voltage regulator
- (d) an amplifier

101. Area enclosed by $|y| = |\sin x|$ between $x = \frac{\pi}{2}$ to $x = \frac{3\pi}{2}$ is

- (a) 0
- (b) 2
- (c) 4
- (d) 2π

102. Let $A = [0, 1]$, $B = [2, 5]$ and $f: A \rightarrow B$ be function defined as $f(x) = 3x + 2$, for every $x \in A$. Then f is

- (a) one-one not onto
- (b) onto not one-one
- (c) one-one and onto
- (d) neither one-one nor onto

103. Consider the following relations in the real numbers

$$R_1 = \{(x, y) \mid x^2 + y^2 \leq 25\}$$

$$R_2 = \{(x, y) \mid y \geq \frac{4x^2}{9}\}$$

Then the range of $R_1 \cup R_2$ is

- (a) $(-5, 3)$
- (b) $[-4, 5]$
- (c) $[3, \infty)$
- (d) $[-5, \infty)$

104. The function $\{x^2 - 4\} | x^2 - 5x + 6 | + \sin(|x|)$ is not differentiable at

- (a) -2
- (b) 0
- (c) 2
- (d) 3

105. If $\alpha, \beta \neq 0$, and $f(n) = \alpha^n + \beta^n$ and

$$\begin{vmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(4) \end{vmatrix} = \delta(1-\alpha)^2(1-\beta)^2(\alpha-\beta)^2.$$

Then δ is equals to

- (a) $\alpha\beta$
- (b) $\frac{1}{\alpha\beta}$
- (c) 1
- (d) -1

106. The value of $\begin{vmatrix} a^2 + \lambda^2 & ab + c\lambda & ca - b\lambda \\ ab - c\lambda & b^2 + \lambda^2 & bc + a\lambda \\ ac + b\lambda & bc - a\lambda & c^2 + \lambda^2 \end{vmatrix} \times \begin{vmatrix} \lambda & c & -b \\ -c & \lambda & a \\ b & -a & \lambda \end{vmatrix}$ is

- (a) $\lambda^3(\lambda^2 + a^2 + b^2 + c^2)^2$
- (b) $\lambda^2(\lambda^3 + a^2 + b^2 + c^2)^3$
- (c) $\lambda(\lambda^2 + a^2 + b^2 + c^2)^2$
- (d) $\lambda^3(\lambda^2 + a^2 + b^2 + c^2)^3$

107. If $\begin{bmatrix} 0 & 2\beta & \nu \\ \alpha & \beta & -\nu \\ \alpha & -\beta & \nu \end{bmatrix}$ is an orthogonal matrix, then the value of $2\alpha^2 + \beta^2 + 3\nu^2$ will

be

- (a) $\frac{13}{7}$
- (b) $\frac{13}{6}$
- (c) $\frac{6}{13}$
- (d) $\frac{2}{13}$

108. If A is a 3×3 non-singular matrix such that : $AA^T = A^T A$ and $B = A^{-1}A^T$, then BB^T is equal to, where I is identity matrix

- (a) $I - B$
- (b) I
- (c) B^{-1}
- (d) $(B^{-1})^2$

109. Minimum area of circle which touches the parabolas $y = x^2 + 1$ and $y^2 = x - 1$ is

- (a) $\frac{9\pi}{32}$ sq.unit
- (b) $\frac{9\pi}{16}$ sq.unit
- (c) $\frac{9\pi}{8}$ sq.unit
- (d) $\frac{9\pi}{4}$ sq.unit



110. The length of the transverse axis of the rectangular hyperbola $xy = 18$ is

- (a) 6
- (b) 12
- (c) 18
- (d) 9

111. Locus of a point whose chord of contact with respect to the circle $x^2 + y^2 = 4$ is a tangent to the hyperbola $xy = 1$, is

- (a) ellipse
- (b) circle
- (c) hyperbola
- (d) parabola

112. The area bounded by the circles $x^2 + y^2 = 1$, $x^2 + y^2 = 4$ and the pair of lines $\sqrt{3}(x^2 + y^2) = 4xy$ is equal to

- (a) $\frac{\pi}{2}$
- (b) $\frac{5\pi}{2}$
- (c) 3π
- (d) $\frac{\pi}{4}$

113. Let $f(x) = x^3 + x^2 + 100x + 7\sin x$, then the equation

$$\frac{1}{y-f(1)} + \frac{2}{y-f(2)} + \frac{3}{y-f(3)} = 0 \text{ has}$$

- (a) both roots lying in $(f(1), f(2))$
- (b) exactly one root lying in $(f(2), f(3))$
- (c) exactly one root lying in $(-\infty, f(1))$
- (d) exactly one root lying in $(f(3), \infty)$

114. The values of 'a' if $f(x) = 2e^x - ae^{-x} + (2a+1)x - 3$ increases for all x are

- (a) $(-\infty, 0]$
- (b) $(0, \infty)$
- (c) $(-\infty, \infty)$
- (d) $(1, \infty)$

115. Four tickets marked 0, 1, 10, 11 respectively are placed in a bag. A ticket is drawn at random five times being replaced each time. Then the probability that the sum of numbers on the tickets thus drawn is 23 is equal to

- (a) $\frac{25}{254}$
- (b) $\frac{25}{252}$
- (c) $\frac{25}{256}$
- (d) None of these



116. The range of the function $f(x) = \log_2 \left(\frac{\sin x - \cos x + 3\sqrt{2}}{\sqrt{2}} \right)$ is

- (a) $[-2, 1]$
- (b) $[1, 2]$
- (c) $[-1, 3]$
- (d) $[2, 4]$

117. If the line $\frac{x-1}{3} = \frac{y-2}{2} = \frac{z-3}{1}$ intersects the curve $x^2 + y^2 + x - y + c = 0$, $z = 0$; then c is

- (a) 98
- (b) -98
- (c) -106
- (d) -108

118. The unit vector perpendicular to vectors $2i + j - k$ and $i - j + 2k$ is

- (a) $\frac{i+5j+3k}{\sqrt{35}}$
- (b) $\frac{5i-j-3k}{\sqrt{35}}$
- (c) $\frac{i+j+k}{\sqrt{3}}$
- (d) $\frac{i-5j-3k}{\sqrt{35}}$

$$\begin{array}{r} 2i + j - k \\ - (i - j + 2k) \\ \hline i + 2j - 3k \end{array}$$

119. The values of a for which the inequality $\frac{x-2a-3}{x-a+2} < 0$ is satisfied for all x belonging to $[1, 2]$, are

- (a) $(-2, 3)$
- (b) $(-1/3, 2)$
- (c) $(-3, 2)$
- (d) $(-1/2, 3)$

120. If \vec{a} and \vec{b} are vectors in space given by $\vec{a} = \frac{\hat{i} + \hat{j}}{\sqrt{2}}$ and $\vec{b} = \frac{\hat{i} - \hat{j} + \hat{k}}{\sqrt{3}}$, then

the value of $(\vec{a} + \vec{b}) \cdot [(\vec{a} \times \vec{b}) \times (\vec{a} - \vec{b})]$ is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

121. If $\log_3 2$, $\log_3 (2^x - 5)$ and $\log_3 (2^x - 7/2)$ are in A.P., then the value of x is

- (a) 3
- (b) 2
- (c) 4
- (d) 5

122. For a differential equation which of the following is correct.

- (a) Degree and order always exists
- (b) Degree and order both may or may not exist
- (c) Order always exists but not degree
- (d) Degree always exists but not order



123. If two events A and B are such that $P(\bar{A})=0.3$, $P(B)=0.4$ and $P(A \cap \bar{B})=0.5$, then $P[B/(A \cup \bar{B})]$ is equal to

- (a) $\frac{1}{4}$
- (b) $\frac{1}{3}$
- (c) $\frac{1}{2}$
- (d) None of these

124. The probability that a man aged x years will die in a year is p . The probability that out of n men M_1, M_2, \dots, M_n each of aged x , M_1 will die and be the first to die is

- (a) $\frac{1}{n^2}$
- (b) $1-(1-p)^n$
- (c) $\frac{1}{n^2} \left[\frac{1}{1-(1-p)^n} \right]$
- (d) $\frac{1}{n} [1-(1-p)^n]$

125. The component of vector $\vec{A} = 2\hat{i} + 5\hat{j} + 7\hat{k}$ in the direction of a vector $\vec{B} = 3\hat{i} - \hat{j} + 5\hat{k}$ is

- (a) $\frac{36}{\sqrt{78}}$
- (b) $\frac{35}{6}$
- (c) $\sqrt{\frac{78}{35}}$
- (d) None of these

126. In a set of four numbers the first three are in G.P. and the last three in A.P. with a common difference 6. If the first number is same as the fourth, the four numbers are

- (a) 3, 9, 15, 21
- (b) 1, 7, 13, 19
- (c) 8, -4, 2, 8
- (d) None of these

127. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} - \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

- (a) $\phi\left(\frac{y}{x}\right) = kx$
- (b) $x\phi\left(\frac{y}{x}\right) = k$
- (c) $\phi\left(\frac{y}{x}\right) = ky$
- (d) $y\phi\left(\frac{y}{x}\right) = k$

128. If the direction cosines of two vectors \vec{a} and \vec{b} are connected by the equations $l+m+n=0$, $l^2-m^2+n^2=0$, then the angle between \vec{a} and \vec{b} is

- (a) π
- (b) $\frac{2\pi}{3}$
- (c) $\frac{\pi}{2}$
- (d) $\frac{\pi}{3}$

129. A and B are two candidates seeking admission in A.M.U. The probability that A is selected is 0.5 and the probability that both A and B are selected is at most 0.5. Then the probability of B getting selected is :

- (a) 0.9
- (b) 0.8
- (c) ≤ 0.8
- (d) ≤ 0.3

130. The area of the region defined by $||x| - |y|| \leq 2$ and $x^2 + y^2 \leq 4$ in the xy -plane is

- (a) 1
- (b) 4π
- (c) π
- (d) 8

131. By graphical method, the solution of linear programming problem Maximize $z = 3x_1 + 5x_2$ subject to $3x_1 + 2x_2 \leq 18$; $x_1 \leq 4$; $x_2 \leq 6$; $x_1, x_2 \geq 0$ is

- (a) $x_1 = 2, x_2 = 0, z = 6$
- (b) $x_1 = 2, x_2 = 6, z = 36$
- (c) $x_1 = 4, x_2 = 3, z = 27$
- (d) $x_1 = 4, x_2 = 6, z = 42$

132. The greatest integer which divides the number $101^{100} - 1$ is

- (a) 100
- (b) 1000
- (c) 10000
- (d) 100000

133. Which of the following statements is incorrect? (where n is any natural number)

- (a) $n(n+1)(n+2)$ is divisible by 12 for each $n \geq 3$.
- (b) $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \dots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$, for each $n \geq 3$.
- (c) $\frac{n^5}{5} + \frac{n^3}{3} + \frac{7n}{15}$ is a natural number for each $n \geq 3$.
- (d) $(10^{2n-1} + 1)$ is divisible by 11 for each $n \geq 3$.

134. If a denotes the number of permutations of $x+2$ objects taken all at a time, b the number of permutations of x objects taken 11 at a time and c the number of permutations of $x-11$ objects taken all at a time such that $a = 182bc$, then the value of x is

- (a) 15
- (b) 12
- (c) 10
- (d) 18

135. The sum of real roots of the equation $x^2 - 2^{2008}x + |x - 2^{2007}| + 2(2^{4013} - 1) = 0$ is

- (a) 2^{2008}
- (b) 2^{2007}
- (c) 2^{2006}
- (d) 2^{2013}

136. Let a, b, c are distinct real numbers. The expression

$$\frac{(x-a)(x-b)}{(c-a)(c-b)} + \frac{(x-b)(x-c)}{(a-b)(a-c)} + \frac{(x-c)(x-a)}{(b-c)(b-a)} - 1$$

assumes the zero value for

- (a) no real value of x
- (b) more than three real values of x
- (c) exactly three real values of x
- (d) exactly two real values of x

137. Let \vec{a} and \vec{c} be unit collinear vectors and $|\vec{b}| = 2$. If $\vec{b} - 2\vec{c} = \lambda\vec{a}$, then the

values of λ are

- (a) 0, 4
- (b) 0, -4
- (c) 0, 2
- (d) 0, -2

138. If $\lim_{x \rightarrow 0} |x|^{\sin x} = L$, then the value of L is

- (a) 0
- (b) 1
- (c) -1
- (d) e

139. The solutions of the equation $5 \cos 3x + 3 \cos x = 3 \sin 4x$ are (where \mathbb{Z} denotes the set of integers)

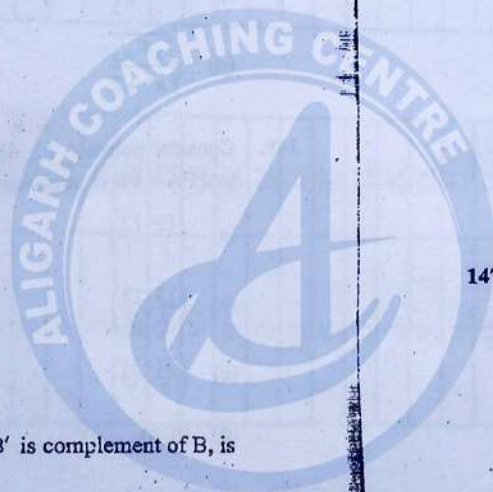
- (a) $n\pi + (-1)^n \times \frac{\pi}{4}, n \in \mathbb{Z}$
- (b) $n\pi + (-1)^n \sin^{-1}\left(\frac{1}{3}\right), n \in \mathbb{Z}$
- (c) $n\pi + (-1)^n \times \frac{\pi}{6}, n \in \mathbb{Z}$
- (d) $2n\pi + \frac{\pi}{3}, n \in \mathbb{Z}$

140. If a circle which passes through (2, 3) and cuts the circle $x^2 + y^2 = 1$ orthogonally, then locus of its centre is

- (a) $2x + 3y - 7 = 0$
- (b) $3x - 2y + 7 = 0$
- (c) $4x + 7y - 3 = 0$
- (d) $7x + 3y - 2 = 0$

141. Let A, B, C be three points represented by complex numbers z_1, z_2, z_3 respectively in a complex plane, $\angle ABC = \text{amp} \left(\frac{z_3 - z_2}{z_1 - z_2} \right)$ is equal to

- (a) $\text{amp} \left(\frac{z_3 - z_2}{z_1 - z_2} \right)$
- (b) $\text{amp} \left(\frac{z_3 - z_1}{z_2 - z_1} \right)$
- (c) $\text{amp} \left(\frac{z_2 - z_3}{z_1 - z_3} \right)$
- (d) $\text{amp} \left(\frac{z_2 - z_3}{z_3 - z_2} \right)$



142. If $\frac{ax}{\cos \theta} + \frac{by}{\sin \theta} = a^2 - b^2$ and $\frac{ax \sin \theta}{\cos^2 \theta} - \frac{by \cos \theta}{\sin^2 \theta} = 0$, then the value of $(ax)^{2/3} + (by)^{2/3}$ is

- (a) $(a-b)^{2/3}$
- (b) $(a+b)^{2/3}$
- (c) $(a^2 - b^2)^{2/3}$
- (d) $(a^2 + b^2)^{2/3}$

143. The solution of the inequality $\frac{1 - \sqrt{1 - 4x^2}}{x} < 3$ is

- (a) $\left(-\frac{1}{2}, \frac{1}{2}\right)$
- (b) $\left(-\frac{1}{2}, 0\right) \cup \left(0, \frac{1}{2}\right)$
- (c) $\left[-\frac{1}{2}, 0\right) \cup \left(0, \frac{1}{2}\right]$
- (d) $(-3, 3]$

144. If A and B are two disjoint sets, then $A \cup B'$, where B' is complement of B, is equal to

- (a) A
- (b) $B - A$
- (c) A'
- (d) B'

145. The total number of symmetric relations on a set A of cardinality 3 is

- (a) 32
- (b) 16
- (c) 64
- (d) 128

146. If a function $f: [2, \infty) \rightarrow A$ defined as $f(x) = x^2 - 4x + 5$ is bijective function, then A is equal to

- (a) R
- (b) $[1, \infty)$
- (c) $[2, \infty)$
- (d) $(5, \infty)$

147. The value of $\int_{-3}^3 \left\lfloor \frac{\cos^2 x}{\left\lfloor \frac{x}{\pi} \right\rfloor + \frac{1}{2}} \right\rfloor dx$, where $\lfloor \cdot \rfloor$ denotes the greatest integer function, is

- (a) 1
- (b) 0
- (c) $9 - \cos 9$
- (d) None of these

148. $\cos[\tan^{-1}\{\sin(\cot^{-1} x)\}]$ is equal to

✓ (a) $\frac{1}{\sqrt{1+x^2}}$

(b) $\tan^{-1} \frac{1}{\sqrt{1+x^2}}$

(c) $\cot^{-1}(\sqrt{1+x^2})$

(d) $\sqrt{\frac{x^2+1}{x^2+2}}$

149. Consider points A (3, 4) and B (7, 13). If P be a point on the line $y = x$ such that $PA + PB$ is minimum, then coordinates of P are

(a) $(\frac{12}{7}, \frac{12}{7})$

$P = (12, 12)$

(b) $(\frac{13}{7}, \frac{13}{7})$

(c) $(\frac{31}{7}, \frac{31}{7})$

(d) (0, 0)

150. Which one is true ?

(a) The operation $*$ defined by $a * b = \frac{a+b}{2}$ is a binary operation in the set I of all integers.

✓ (b) The operation $*$ defined by $a * b = \frac{a+b}{2}$ is a binary operation in the set Q of all rationals.

(c) The operation subtraction is a binary operation in the set of all non-zero integers.

(d) The operation subtraction is a binary operation in the set N of all natural numbers.



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Answer Key (B.TECH.) Admission Test 2020-21

SERIES: D



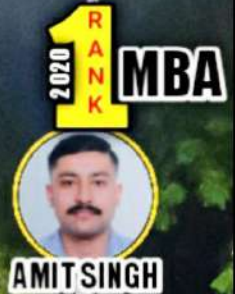
Q.No.	Answer
1	A
2	C
3	A
4	A
5	B
6	A
7	C
8	C
9	C
10	C
11	B
12	B
13	A
14	D
15	B
16	A
17	A
18	D
19	B
20	C
21	D
22	C
23	D
24	A
25	C
26	A
27	B
28	B
29	C
30	A
31	B
32	C
33	C
34	D
35	D
36	C
37	A
38	C
39	D
40	C
41	B
42	D
43	C
44	B
45	C
46	A
47	B
48	C
49	B
50	C

Q.No.	Answer
51	C
52	C
53	A
54	B
55	C
56	D
57	A
58	A
59	C
60	D
61	A
62	C
63	D
64	A
65	D
66	B
67	D
68	A
69	C
70	A
71	D
72	B
73	A
74	C
75	D
76	D
77	C
78	C
79	D
80	A
81	A
82	B
83	C
84	C
85	A
86	A
87	D
88	B
89	C
90	D
91	A
92	C
93	C
94	C
95	A
96	B
97	C
98	C
99	A
100	C

Q.No.	Answer
101	C
102	C
103	C
104	B
105	D
106	D
107	C
108	D
109	B
110	B
111	A
112	B
113	C
114	D
115	B
116	B
117	B
118	D
119	B
120	D
121	D
122	A
123	A
124	C
125	D
126	D
127	C
128	B
129	B
130	C
131	C
132	B
133	B
134	C
135	A
136	B
137	A
138	B
139	B
140	C
141	B
142	A
143	A
144	C
145	C
146	D
147	C
148	B
149	B
150	D

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