Set Code : **T2**

Booklet Code : **A**

PHYSICS

51. Two quantities A and B are related by the relation A/B = m where m is linear mass density and A is force. The dimensions of B will be

(1) same as that of latent heat (2) same as that of pressure

(3) same as that of work (4) same as that of momentum

52. The dimensional formula of capacitance in terms of M, L, T and I is

(1) $[ML^2T^2I^2]$ (2) $[ML^{-2}T^4I^2]$ (3) $[M^{-1}L^3T^3I]$ (4) $[M^{-1}L^{-2}T^4I^2]$

53. If l, m and n are the direction cosines of a vector, then

(1) $l + m + n = 1$ (2) $l^2 + m^2 + n^2 = 1$ (3) $\frac{1}{l}+\frac{1}{m}+\frac{1}{n}=1$ (4) $lmn = 1$

54. The angle between i+j and j+k is

(1) 0° (2) 90° (3) 45° (4) 60°

55. A particle is moving eastwards with a velocity of 5 ms^{-1}. In 10 seconds the velocity changes to 5 ms^{-1} northwards. The average acceleration in this time is

(1) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-west (2) zero

(3) $\frac{1}{2}$ ms^{-2} towards north (4) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-east

56. The linear momentum of a particle varies with time t as $p = a+bt+ct^2$ which of the following is correct?

(1) Force varies with time in a quadratic manner.

(2) Force is time-dependent.

(3) The velocity of the particle is proportional to time.

(4) The displacement of the particle is proportional to t.

57. A shell of mass m moving with a velocity v suddenly explodes into two pieces. One part of mass $m/4$ remains stationary. The velocity of the other part is

(1) v (2) $2v$ (3) $3v/4$ (4) $4v/3$

58. The velocity of a freely falling body after 2s is
(1) 9.8 ms^{-1} (2) 10.2 ms^{-1} (3) 18.6 ms^{-1} (4) 19.6 ms^{-1}

59. A large number of bullets are fired in all directions with the same speed u. The maximum area on the ground on which these bullets will spread is

(1) $\frac{\pi u^2}{g^2}$ (2) $\frac{\pi u^4}{g^2}$ (3) $\frac{\pi u^2}{g^4}$ (4) $\frac{\pi u}{g^4}$

60. The minimum stopping distance for a car of mass m, moving with a speed v along a level road, if the coefficient of friction between the tyres and the road is μ, will be

(1) $\frac{v^2}{2\mu g}$ (2) $\frac{v^2}{\mu g}$ (3) $\frac{v^2}{4\mu g}$ (4) $\frac{v}{2\mu g}$

61. When a bicycle is in motion, the force of friction excreted by the ground on the two wheels is such that it acts
(1) In the backward direction on the front wheel and in the forward direction on the rear wheel
(2) In the forward direction on the front wheel and in the backward direction on the rear wheel
(3) In the backward direction on both the front and the rear wheels
(4) In the forward direction on both the front and the rear wheels

62. In a perfectly inelastic collision, the two bodies
(1) strike and explode (2) explode without striking
(3) implode and explode (4) combine and move together

63. Under the action of a constant force, a particle is experiencing a constant acceleration, then the power is
(1) zero (2) positive
(3) negative (4) increasing uniformly with time

64. Consider the following two statements:

A : Linear momentum of a system of particles is zero.

B : Kinetic energy of a system of particles is zero.

Then

(1) A implies B & B implies A (2) A does not imply B & B does not imply A

(3) A implies B but B does not imply A (4) A does not imply B but B implies A

65. An engine develops 10 kW of power. How much time will it take to lift a mass of 200 kg to a height of 40 m? (Given g = 10 ms^{-2})

(1) 4s (2) 5s (3) 8s (4) 10s

66. If a spring has time period T, and is cut into *n* equal parts, then the time period will be

(1) $T\sqrt{n}$ (2) $\frac{T}{\sqrt{n}}$ (3) nT (4) T

67. When temperature increases, the frequency of a tuning fork

(1) increases

(2) decreases

(3) remains same

(4) increases or decreases depending on the materials

68. If a simple harmonic motion is represented by $\frac{d^2x}{dy^2}+\alpha x=0$, its time period is

(1) $2\pi\sqrt{\alpha}$ (2) $2\pi\alpha$ (3) $\frac{2\pi}{\sqrt{\alpha}}$ (4) $\frac{2\pi}{\alpha}$

69. A cinema hall has volume of 7500 m^3. It is required to have reverberation time of 1.5 seconds. The total absorption in the hall should be

(1) 850 w-m^2 (2) 82.50 w-m^2 (3) 8.250 w-m^2 (4) 0.825 w-m^2

70. To absorb the sound in a hall which of the following are used
(1) Glasses, stores
(2) Carpets, curtains
(3) Polished surfaces
(4) Platforms

71. If N represents avagadro's number, then the number of molecules in 6 gm of hydrogen at NTP is
(1) 2N (2) 3N (3) N (4) N/6

72. The mean translational kinetic energy of a perfect gas molecule at the temperature T K is
(1) $\frac{1}{2}kT$ (2) kT (3) $\frac{3}{2}kT$ (4) $2kT$

73. The amount of heat given to a body which raises its temperature by 1°C
(1) water equivalent
(2) thermal heat capacity
(3) specific heat
(4) temperature gradient

74. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio Cp/Cv for gas is
(1) $\frac{3}{2}$ (2) $\frac{4}{3}$ (3) 2 (4) $\frac{5}{3}$

75. Cladding in the optical fiber is mainly used to
(1) to protect the fiber from mechanical stresses
(2) to protect the fiber from corrosion
(3) to protect the fiber from mechanical strength
(4) to protect the fiber from electromagnetic guidance

37. $\int_0^{\frac{\pi}{2}} \cos^{11} x \, dx =$

(1) $\frac{256}{693}$ (2) $\frac{256\pi}{693}$ (3) $\frac{\pi}{4}$ (4) $\frac{128}{693}$

38. $\int f^1(x).[f(x)]^n \, dx =$

(1) $\frac{[f(x)]^{n-1}}{n-1}+C$ (2) $\frac{[f(x)]^{n+1}}{n+1}+C$ (3) $n[f(x)]^{n-1}+C$ (4) $(n+1)[f(x)]^{n+1}+C$

39. $\int \frac{dx}{(x+7)\sqrt{x+6}} =$

(1) $Tan^{-1}(\sqrt{x+6})+C$ (2) $2Tan^{-1}(\sqrt{x+6})+C$

(3) $Tan^{-1}(x+7)+C$ (4) $2Tan^{-1}(x+7)+C$

40. $\int \tan^{-1} x \, dx =$

(1) $x.Tan^{-1}x+\frac{1}{2}\log(1+x^2)+C$ (2) $\frac{1}{1+x^2}+C$

(3) $x^2.Tan^{-1}x+C$ (4) $x.Tan^{-1}x-\log\sqrt{1+x^2}+C$

41. $\int \frac{dx}{1+e^{-x}} =$

(1) $\log(1+e^{-x})+C$ (2) $\log(1+e^{x})+C$

(3) $e^{-x}+C$ (4) $e^{x}+C$

42. $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \sin|x| \, dx =$

(1) 0 (2) 1 (3) 2 (4) -1

43. Area under the curve $f(x) = \sin x$ in $[0, \pi]$ is

(1) 4 sq. units (2) 2 sq. units (3) 6 sq. units (4) 8 sq. units

44. The order of $x^3 \frac{d^3y}{dx^3} + 2x^2 \frac{d^2y}{dx^2} - 3y = x$ is

(1) 1 (2) 4 (3) 3 (4) 2

45. The degree of $\left[\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}} = a\frac{d^2y}{dx^2}$ is

(1) 4 (2) 2 (3) 1 (4) 3

46. The family of straight lines passing through the origin is represented by the differential equation

(1) $ydx + xdy = 0$ (2) $xdy - ydx = 0$ (3) $xdx + ydy = 0$ (4) $xdx - ydy = 0$

47. The differential equitation $\frac{dy}{dx} + \frac{ax + hy + g}{hx + by + f} = 0$ is called

(1) Homogeneous (2) Exact (3) Linear (4) Legender

48. The solution of differential equation $\frac{dy}{dx} = e^{-x^2} - 2xy$ is

(1) $y.e^{-x^2} = x + c$ (2) $ye^x = x + c$ (3) $ye^{x^2} = x + c$ (4) $y = x + c$

49. The complementary function of $(D^3+D^2+D+1)\,y = 10$ is

(1) $C_1\cos x + C_2\sin x + C_3e^{-x}$ (2) $C_1\cos x + C_2\sin x + C_3e^x$

(3) $C_1 + C_2\cos x + C_3\sin x$ (4) $(C_1 + C_2x + C_3x^2)\,e^x$

50. Particular Integral of $(D-1)^4y = e^x$ is

(1) $x^4\,e^x$ (2) $\frac{x^4}{24}e^{-x}$ (3) $\frac{x^4}{12}e^x$ (4) $\frac{x^4}{24}e^x$

94. Carrosion of a metal is fastest in
(1) rain-water (2) acidulated water (3) distilled water (4) de-ionised water

95. Which of the following is a thermoset polymer?
(1) Polystyrene (2) PVC
(3) Polythene (4) Urea-formaldehyde resin

96. Chemically, neoprene is
(1) polyvinyl benzene (2) polyacetylene
(3) polychloroprene (4) poly-1,3-butadiene

97. Vulcanization involves heating of raw rubber with
(1) selenium element (2) elemental sulphur
(3) a mixture of Se and elemental sulphur (4) a mixture of selenium and sulphur dioxide

98. Petrol largely contains
(1) a mixture of unsaturated hydrocarbons C_5 - C_8
(2) a mixture of benzene, toluene and xylene
(3) a mixture of saturated hydrocarbons C_{12} - C_{14}
(4) a mixture of saturated hydrocarbons C_6 - C_8

99. Which of the following gases is largely responsible for acid-rain?
(1) SO_2 & NO_2 (2) CO_2 & water vapour
(3) CO_2 & N_2 (4) N_2 & CO_2

100. BOD stands for
(1) Biogenetic Oxygen Demand (2) Biometric Oxygen Demand
(3) Biological Oxygen Demand (4) Biospecific Oxygen Demand

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BIO TECHNOLOGY

101. Agar-agar was used for the first time for culturing microbes in 1882 by

(1) Louis Pasteur
(2) Robert Koch
(3) Beijernick
(4) Joseph Lister

102. What are pesticides used to kill weeds called?

(1) Biopesticides
(2) Antimicrobials
(3) Fungicides
(4) Herbicides

103. Which on of the following is not a nitrogen-fixing organism?

(1) Anabaena
(2) Nostoc
(3) Azotobacter
(4) Pseudomonas

104. Addition of blood to a culture medium only allows the hemolytic bacteria that grow on the plate to be picked out. This is an example of a

(1) Differential media
(2) Liquid media
(3) Chemically defined media
(4) Selective media

105. For what purpose are semisolid media used?

(1) Isolation of discrete colonies
(2) Subculturing microorganisms
(3) Obtaining growth throughout the tube
(4) Determination of motility of a culture

106. The endotoxins released from Bacillus thuringiensis are known as

(1) Cry proteins
(2) Toxin proteins
(3) Bacilli proteins
(4) Sat proteins

107. Phosphate solubilizing bacteria converts
(1) Soluble to insoluble form of phosphorous
(2) Insoluble to soluble form of phosphorous
(3) Soluble to inactive insoluble form of phosphorous
(4) Insoluble to inactive soulble form of phosphorous

108. Azolla sps are used as biofertilizers to control mosquito larvae in
(1) Rice fields (2) Wheat fields (3) Jowar fields (4) Millet fields

109. Wilson & Blair's medium is used for isolation of
(1) Pseudomona sps (2) Enterobacter sps
(3) Lactobacillus sps (4) Salmonella sps

110. Photoautotrophs acquire energy from
(1) Sunlight and methane (2) Sunlight and carbondioxide
(3) Sunlight and benezene (4) Sunlight and ammonia

111. Living, unstained cells and organisms can be observed best using
(1) Flourescent microscopy (2) TEM
(3) Phase contrast microscopy (4) SEM

112. Cell theory was proposed by
(1) Schieiden and Schwann (2) Watson and Crick
(3) Messelon and Stahl (4) Gregor and Mendel

113. Peripheral membrane proteins
(1) are generally noncovalently bound to membrane lipids
(2) are usually denatured when released from membranes
(3) can be released from membranes only by treatment with detergents
(4) may have functional units on both sides of the membrane