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BPH-EE-2016(SET-Z)

A

Sr. No. 11497

Time : **1¼ Hours (75 minutes)** Total Questions : **130** Max. Marks : **100**

Candidate's Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Roll No. (in figures) _____ (in words) _____

Date of Exam : _____

_____ _____

(Signature of the Invigilator) (Signature of the Candidate)

CANDIDATES MUST READ THE FOLLOWING INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER & FOLLOW THEM.

1. All questions under **Part – A** and **Part – B** are ***compulsory***. **Part – C** is optional. The candidates may attempt either Optional **Part – C(i) OR** Optional **Part – C(ii)**. All questions carry equal marks i.e. ***one*** mark each.
2. The candidates ***must return*** this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself.
4. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing ***within two hours*** after the test is over. No such complaint(s) will be entertained thereafter.
5. ***Use only blue or black ball point pen of good quality in the OMR Answer-Sheet.***
6. There will be ***no negative*** marking. Each correct answer will be awarded ***one*** full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. *Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after the start of examination.*

PART – A

PHYSICS

1. The dimensions of solar constant which relates to the energy received by the earth are :

   (1) $[ML^2 T^{-3}]$ (2) $[M^2 L^0 T^{-1}]$ (3) $[ML^0 T^{-3}]$ (4) $[ML^1 T^{-2}]$

2. If the speed of light is 3×10^{10} cm sec^{-1}, the distance travelled by the light in one light year in meters is :

   (1) 3×10^{12} (2) 9.461×10^{15}

   (3) 3×10^{15} (4) 3.126×10^{14}

3. If a car travels 4 km towards north at an angle of 45° to the east and then travels a distance of 2 km towards north at an angle of 135° to the east, the total distance travelled by the car in km is :

   (1) 6 (2) 8 (3) 5.64 (4) 4.95

4. If $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$ and θ increases at a uniform rate ω, then the velocity of the particle is :

   (1) $a\omega$ (2) $a^2\theta/\omega$ (3) $a\theta/\omega$ (4) $a\theta\omega$

5. If the velocity of a moving particle, $v = x^n$ where x is the displacement, then :

   (1) when $x = 0$, the velocity and acceleration are zero

   (2) for the body in motion, $n > 1/2$

   (3) for the body in motion, $n < 1/2$

   (4) both (1) and (2)

6. A uniform chain of length l is suspended with lower end just touching a horizontal table. Find the pressure on the table, when a length has reached the table :

   (1) mgx (2) 2mgx (3) 3mgx (4) mgx/2

7. Fine particle of a substance are to be stored in a heap on a horizontally circular plate of radius a. If the coefficient of static friction between the particles is k, the maximum possible height of the cone will be :

(1) ak (2) $ak/2$

(3) a/k (4) ak^2

8. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb line is suspended from the roof of the car by a light rigid rod of length 1 m. The angle made by the rod with the track is :

(1) zero (2) 30°

(3) 45° (4) 60°

9. If a compressed string is dissolved in acid :

(1) the energy of the string increases

(2) the energy of the acid decreases

(3) the kinetic energy and potential energy of the acid molecules increases

(4) the temperature of the acid increases

10. The power supplied by a force acting on a particle moving in a straight line is constant. The velocity of the particle varies with displacement as :

(1) $\sqrt{x}$ (2) x

(3) x^2 (4) $x^{1/3}$

11. The centre of mass of a system cannot change its state of motion, unless there is an external force acting on it. Yet the internal force of the brakes can bring a car to rest. Then :

(1) the brakes stop the vehicle

(2) the friction between brake pads and the wheel stops the car

(3) the car is stopped by the road

(4) the car is stopped by the driver pressing the pedal

12. If the momentum of a body remains constant, then the mass-speed graph of the body is a :

(1) circle (2) straight line

(3) rectangular hyperbola (4) parabola

13. A body of mass M moving with a speed u has a head-on collision with a body of mass m at rest. If M >> m, the speed of the body with mass m after the collision will be nearly :

(1) um/M (2) uM/m (3) u/2 (4) 2u

14. If a body moves through a distance greater than $2\pi R$ in one full rotation, then :

(1) $v_{cm} > R\omega$ (2) $v_{cm} < R\omega$ (3) $v_{cm} \geq R\omega$ (4) $v_{cm} \leq R\omega$

15. The work done by an external agent to shift a point mass from infinity to the centre of earth is :

(1) zero (2) greater than zero

(3) less than zero (4) ≤ 0

16. The time period of a simple pendulum at the centre of earth is :

(1) zero (2) infinity

(3) less than zero (4) none of the three before

17. In an experiment, a capillary tube is kept vertical and the water rises upto 3 mm height in the tube. When the tube is tilted at an angle of 60° with the vertical, the height of the water will be :

(1) 6 mm (2) 4 mm (3) 3 mm (4) 4.5 mm

18. The energy required to increase the radius of a soap bubble from 1 cm to 2 cm, assuming surface tension to be 30 dyne cm^{-1}, is :

(1) 240π ergs (2) 720π ergs

(3) 480π ergs (4) 120π ergs

19. The bulk modulus for an incompressible liquid is :

(1) ∞ (2) 0 (3) 1 (4) 2

20. A transverse wave with speed 3000 m sec^{-1} passes along a stretched wire. If the tension in the wire increases four times, then the velocity of the wave is :

(1) 1500 m sec^{-1} (2) 3000 m sec^{-1}

(3) 6000 m sec^{-1} (4) 9000 m sec^{-1}

21. If a stone is dropped into a lake from the top of a tower, the sound of the splash is heard by a man on the tower after 11.5 seconds. The height of the tower is :

(1) 1000 m (2) 750 m (3) 500 m (4) 250 m

22. The average value of which of the following quantities is zero for the molecule of an ideal gas in equilibrium :

(1) Kinetic energy (2) Momentum

(3) Density (4) Speed

23. If three moles of an ideal gas are compressed to half the initial volume at a constant temperature of 300 K, the amount of work done is :

(1) – 5188 J (2) 5000 J (3) 5188 J (4) – 5000 J

24. A telescope consists of two lenses of focal length 10 cm and 1 cm. Calculate the length of the telescope, when an object is kept at a distance of 60 cm from the objective then the final image is formed at least distance of distinct vision :

(1) 15.05 cm (2) 12.96 cm

(3) 13.63 cm (4) 14.44 cm

25. At the eight corners of a cube of side 10 cm, equal charges each of value 10 C are placed. The resulting potential at the centre of the cube is :

(1) 83.11×10^{11} V (2) 16.62×10^{11} V

(3) 1.66×10^{11} V (4) 1662.77×10^{11} V

26. A circular flexible loop of wire of radius r carrying a current I is placed in a uniform magnetic field B. If B is doubled, the tension in the loop :

(1) is unchanged (2) is doubled

(3) is halved (4) is quadrupled

27. The magnetic moment of a diamagnetic atom is :

(1) zero (2) ∞

(3) $-\infty$ (4) 1.08

28. The sum and difference of the self inductances of two coils are 13 H and 5 H respectively. The maximum mutual inductances of the two coils is :

(1) 6 H (2) 5 H

(3) $\sqrt{65}$ H (4) 18 H

29. A current I = 3 + 8 sin 100t is passing through a resistor of resistance 10 Ω. The effective value of the current is :

(1) 5 A (2) 10 A

(3) $4\sqrt{2}$ A (4) $3\sqrt{2}$ A

30. If the work function of a metal is 10 eV and is subjected to bombardment by photons of 20 eV, then the frequency of photoelectrons will be :

(1) $= 10/h$ (2) $> 10/h$

(3) $< 10/h$ (4) $\geq 10/h$

31. The ratio of frequencies of the long wavelength limits of the Balmer and Lyman series of hydrogen is :

(1) 27 : 5 (2) 5 : 27

(3) 4 : 1 (4) 1 : 4

32. The ratio of half-life to the mean life of a radioactive sample with decay constant λ :

(1) 0.693
(2) $\sqrt{0.693}$
(3) 1/0.693
(4) $(0.693)^2$

33. The forbidden energy gap of Si and Ge respectively is :

(1) 1 eV, 2 eV
(2) 1.5 eV, 3.0 eV
(3) 1.11 eV, 0.7 eV
(4) 0.7 eV, 1.11 eV

34. In a CE amplifier if the value of i_c/i_e is 0.98, then the value of β will be :

(1) 98
(2) 0.98
(3) 49
(4) 1.96

35. The spectrum of a star is usually :

(1) continuous emission spectrum
(2) continuous absorption spectrum
(3) line absorption spectrum
(4) line emission spectrum

PART – B

CHEMISTRY

36. How many molecules are present in one gram of hydrogen ?

(1) 6.02×10^{23}
(2) 3.01×10^{23}
(3) 2.5×10^{23}
(4) 1.5×10^{23}

37. The de-Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is :

(1) 6.63×10^{-33} m
(2) 6.63×10^{-34} m
(3) 6.63×10^{-35} m
(4) 6.63×10^{-36} m

38. Which of the following is correct order of size ?

(1) $I > I^- > I^+$
(2) $I > I^+ > I^-$
(3) $I^+ > I^- > I$
(4) $I^- > I > I^+$

39. IF_5 has the following hybridization :

(1) sp^3d^2 (2) sp^3d^3

(3) sp^3d (4) none of these

40. Absolute zero is the temperature at which :

(1) Rotational motion ceases (2) Volume become zero

(3) Mass become zero (4) None of these

41. Entropy of vaporization of water at 100°C, if molar heat of vaporization is 9710 Cal mol^{-1} will be :

(1) 20 Cal mol^{-1} K^{-1} (2) 26 Cal mol^{-1} K^{-1}

(3) 24 Cal mol^{-1} K^{-1} (4) 28 Cal mol^{-1} K^{-1}

42. 1 mole of N_2 and 2 moles of H_2 are allowed to react in a 1 dm^3 vessel. At equilibrium 0.8 mole of NH_3 is formed. The concentration of H_2 in the vessel is :

(1) 0.6 M (2) 0.8 M

(3) 0.2 M (4) 0.4 M

43. Which is most powerful reducing agent ?

(1) Molecular hydrogen (2) Atomic hydrogen

(3) Nascent hydrogen (4) All have same reducing power

44. Lithium is the strongest reducing agent among alkali metals due to which of the following factor ?

(1) Ionization energy (2) Electron affinity

(3) Hydration energy (4) Lattice energy

45. Potassium is stored under :

(1) Water (2) Ethyl alcohol

(3) Liquid ammonia (4) Kerosene

46. Pyrosilicate ion is :

(1) SiO_2^{2-} (2) SiO_4^{2-}

(3) $Si_2O_6^{7-}$ (4) $Si_2O_7^{6-}$

47. Ethylene reacts with sulphur monochloride to give :

(1) Phosgene (2) Mustard gas

(3) Ethylene chloride (4) None of these

48. Which one of the following regions of atmosphere contains Ozone ?

(1) Troposphere (2) Thermosphere

(3) Mesosphere (4) Stratosphere

49. Azeotropic mixtures are :

(1) Constant boiling mixture (2) Those which boil at different temp.

(3) Mixture of two solids (4) None of these

50. An example of Frenkel as well as Schottky defect is :

(1) *NaBr* (2) *TlBr*

(3) *AgBr* (4) *CuBr*

51. Which of the following substance acts as superconductor at 4 K ?

(1) *Hg* (2) *Cu*

(3) *Na* (4) *Mg*

52. In fireflies the flashes are produced due to combustion of a protein luciferin in air and moisture. The phenomenon is known as :

(1) Photochemical change (2) Photo combustion

(3) Chemiluminescence (4) None of these

53. For the Coagulation of 100 mL of arsenious sol, 5 mL of 1 M *NaCl* is required. The flocculation value of *NaCl* is :

(1) 5 (2) 50 (3) 25 (4) 1

54. A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14}\ s^{-1}$. The half-life of the reaction is :

(1) 1.26×10^{13} s (2) 1.26×10^{-13} s

(3) 5.5×10^{13} s (4) 5.5×10^{-13} s

55. Which of the following is ***not*** a metal refining process ?

(1) Baeyer's process (2) Mond process

(3) Van Arkel process (4) Liquation process

56. The set with correct order of acidity is :

(1) $HClO < HClO_2 < HClO_3 < HClO_4$

(2) $HClO_4 < HClO_3 < HClO_2 < HClO$

(3) $HClO < HClO_4 < HClO_3 < HClO_2$

(4) $HClO_4 < HClO_2 < HClO_3 < HClO$

57. The gas obtained when bleaching powder is treated with warm concentrated solution of NH_3 is :

(1) Cl_2 (2) N_2 (3) NO (4) H_2

58. When SO_2 is passed through acidified $K_2Cr_2O_7$ solution :

(1) The solution turns blue (2) The solution is decolorized

(3) The solution turns green (4) SO_2 is reduced

59. The complex used as an anticancer agent is :

(1) mer – $[Co(NH_3)_3Cl_3]$ (2) Cis – $[PtCl_2(NH_3)_2]$

(3) Cis – $K_2[PtCl_2Br_2]$ (4) Na_2CoCl_4

60. Which is ***not*** an organometallic compound ?

(1) C_3H_7MgI (2) C_2H_5ONa

(3) $(C_2H_5)_3Al$ (4) TEL

61. Phenol $\xrightarrow{1.\,NaOH\ \ 2.\,CO_2/140°C} A \xrightarrow{H^+/H_2O} B \xrightarrow{Ac_2O} C$

In this reaction, the end product is :

(1) Salicylaldehyde (2) Salicylic acid

(3) Phenyl acetate (4) Aspirin

62. Malonic acid on heating gives :

(1) Formic acid (2) Acetic acid (3) Oxalic acid (4) Acetaldehyde

63. An organic compound (A) on reduction gives compound (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N-methylaniline. The compound (A) is :

(1) Methylamine (2) Nitromethane (3) Aniline (4) Nitrobenzene

64. Keratin, a structural protein is present in :

(1) Hair (2) Skin (3) Wool (4) All of these

65. In DNA, the complimentary bases are :

(1) Adenine and thymine; guanine and uracil

(2) Adenine and thymine; guanine and cytosine

(3) Adenine and guanine; thymine and uracil

(4) Adenine and uracil; guanine and cytosine

66. The vitamin which is neither soluble in water nor in fat is :

(1) Phylloquinone (2) Biotin

(3) Thiamine (4) Ergocalciferol

67. Violet colour is obtain when dilute $CuSO_4$ is added in an alkaline solution of protein. The test is known as :

(1) Biuret test (2) Xanthoproteic test

(3) Million's test (4) Ninhydrin test

68. The hormone that helps in conversion of glucose in glycogen is :

(1) Cortisone (2) Calcitonin

(3) Adrenaline (4) Insulin

69. Which of the following is used as "a morning after pill" ?

(1) Norethindrone (2) Ethynylestradiol

(3) Mifepristone (4) Bithional

70. Barbituric acid and its derivatives are well known as :

(1) Tranquilizers (2) Antiseptics

(3) Analgesics (4) Antipyretics

OPTIONAL

PART – C (i)

MATHEMATICS

71. If A and B are two non-empty sets, then $A \cap (B \cup A)' =$

(1) ϕ (2) A

(3) B (4) Not defined

72. If $f(x) = 3^x$, then f(0), f(1), f(2) ..... are in :

(1) AP (2) GP

(3) HP (4) AG series

73. The value of $\frac{1-\tan^2 15^\circ}{1+\tan^2 15^\circ}$ is :

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

74. Which of the following statements is incorrect ?

(1) $\cos\theta = \frac{2}{5}$ (2) $\sin\theta = -\frac{1}{3}$

(3) $\sec\theta = \frac{1}{2}$ (4) $\tan\theta = 6$

75. For any complex number z, the minimum value of $|z|+|z-1|$ is :

(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) $\frac{2}{3}$

76. If ${}^nP_r = 120\ {}^nC_r$, then the value of r is :

(1) 4 (2) 5 (3) 6 (4) 7

77. The number of terms in the expansion of $(1+\sqrt{2}x)^9+(1-\sqrt{2}x)^9$ is :

(1) 10 (2) 9 (3) 8 (4) 5

78. If $a = 1 + x + x^2 + \ldots\ldots\ldots \infty$ and $b = 1 + y + y^2 + \ldots\ldots\ldots \infty$ where x and y are proper fractions, then $1 + xy + x^2y^2 + \ldots\ldots\ldots \infty$ is equal to :

(1) $\frac{ab}{a+b-1}$ (2) $\frac{ab}{a+b}$ (3) $\frac{ab}{a-b}$ (4) $\frac{a+b}{a-b}$

79. A straight line passes through (2, 2) and is perpendicular to the line $3x + y = 3$. Its y-intercept is :

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$ (3) $\frac{3}{4}$ (4) $\frac{4}{3}$

80. The line $x + y = 2$ is a normal to the parabola $y^2 = 8x$ at the point :

(1) (2, 4) (2) (−2, 4) (3) (4, 2) (4) (3, 2)

81. If the x-coordinate of a point P on the join of A(2, 2, 1) and B(5, 1, –2) is 4, then its y–coordinate is :

(1) 2 (2) $\frac{3}{2}$ (3) $\frac{4}{3}$ (4) -2

82. The value of $\lim_{x\to 0}\frac{\sqrt{1-\cos x^2}}{1-\cos x}$ is :

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

83. If $x^y = e^{x-y}$, then $\frac{dy}{dx} =$

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

(3) $\frac{1}{1+\log x}$ (4) $\frac{\log x}{1+\log x}$

84. Mean square deviation of a distribution is least when deviations are taken about :

(1) mode (2) mean (3) median (4) zero

85. Two players play a game where each of them is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial is :

(1) $\frac{1}{5}$ (2) $\frac{19}{25}$ (3) $\frac{1}{25}$ (4) $\frac{24}{25}$

86. If $f : R \to R$ is a mapping defined by $f(x) = x^3 + 3$, then $f^{-1}(x)$ is equal to :

(1) $(x + 3)^{1/3}$ (2) $(x - 3)^{1/3}$

(3) $(3 - x)^{1/3}$ (4) $(x^3 + 3)^{-1}$

87. If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$, then $x =$

(1) 0 (2) $\frac{4}{5}$ (3) $\frac{3}{5}$ (4) $\frac{1}{5}$

88. If A and B are symmetric matrices of the same order then AB – BA is :

(1) Unit matrix
(2) Symmetric matrix
(3) Skew-symmetric matrix
(4) Null matrix

89. The value of the determinant

$$\begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha+\beta) & -\sin(\alpha+\beta) & 1 \end{vmatrix} \text{ is :}$$

(1) Independent of β
(2) Independent of α
(3) Independent of α and β
(4) Zero

90. If $y = x + e^x$, then $\frac{d^2x}{dy^2} =$

(1) $\frac{-e^x}{(1+e^x)^3}$
(2) $\frac{-e^x}{(1+e^x)^2}$
(3) $\frac{1}{(1+e^x)^2}$
(4) $\frac{e^x}{1+e^x}$

91. If the tangent to the curve $x = a(\theta + \sin\theta)$, $y = a(1 + \cos\theta)$ at $\theta = \pi/3$ makes an ang α with the x-axis, then $\alpha =$

(1) $\pi/6$
(2) $\pi/2$
(3) $5\pi/6$
(4) $2\pi/3$

92. The value of K for which the function $f(x) = K \sin x + \frac{1}{3}\sin 3x$ has an extremum $x = \pi/3$ is :

(1) 0
(2) 1
(3) 2/3
(4) 2

93. The function $f(x) = x + \cot^{-1} x$ increases in the interval :

(1) $(-\infty, \infty)$
(2) $(-1, \infty)$
(3) $(1, \infty)$
(4) $[0, \infty)$

94. $\int \frac{x+\sin x}{1+\cos x}\,dx =$

(1) $\tan\frac{x}{2}+c$ (2) $x\tan\frac{x}{2}+c$

(3) $\cot\frac{x}{2}+c$ (4) $x\cot\frac{x}{2}+c$

95. $\int_0^{\log 5} \frac{e^x\sqrt{e^x-1}}{e^x+3}\,dx =$

(1) $2+\pi$ (2) $3-\pi$ (3) $4-\pi$ (4) $3+2\pi$

96. The area of the region lying between the line $x-y+2=0$ and the curve $x=\sqrt{y}$ is :

(1) 4/3 (2) 5/4 (3) 9/2 (4) 10/3

97. If $f(x)=f'(x)$ and $f(1)=2$, then $f(3)=$

(1) $2e^2$ (2) $3e^2$ (3) $2e^3$ (4) $\frac{e^2}{3}$

98. If $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=4\hat{i}+3\hat{j}+4\hat{k}$ and $\vec{c}=\hat{i}+\alpha\hat{j}+\beta\hat{k}$ are linearly dependent vectors and $|\vec{c}|=\sqrt{3}$, then :

(1) $\alpha=1,\beta=\pm1$ (2) $\alpha=\pm1,\beta=1$

(3) $\alpha=-1,\beta=\pm1$ (4) $\alpha=\pm1,\beta=-1$

99. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the curve $xy=c^2, z=0$ then $c=$

(1) $\pm\sqrt{5}$ (2) $\pm\sqrt{3}$

(3) $\pm\frac{1}{3}$ (4) $\pm\frac{\sqrt{5}}{2}$

100. A coin is tossed three times, the probability of getting head and tail alternately is :

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

OPTIONAL

PART – C (ii)

BIOLOGY

101. Viroids are :

(1) ssRNA not enclosed by protein coat

(2) ssRNA enclosed by protein coat

(3) dsRNA enclosed by protein coat

(4) dsDNA enclosed by protein coat

102. The seedless vascular plants are :

(1) Bryophytes (2) Pteridophytes

(3) Gymnosperms (4) Angiosperms

103. The spindle fibers involved in the separation and migration of chromosomes during telophase are made of :

(1) Microbodies (2) Microsomes

(3) Microtubules (4) Endoplasmic reticulum

104. A monocarpic plant :

(1) Has one carpel

(2) Produces only one seed

(3) Produces one fruit only

(4) Flowers only once in lifetime

105. Zymogen is :

(1) Enzyme poison (2) Enzyme modulator

(3) Enzyme precursor (4) Enzyme inhibitor

106. A disaccharide made up of two glucose units is :

(1) Sucrose (2) Maltose (3) Lactose (4) Dextrin

107. A cell organelle which is bounded by a single membrane and contains enzymes involved in conversion of fat to carbohydrate is :

(1) Spherosomes (2) Lysosomes

(3) Glyoxysomes (4) Peroxisomes

108. Iron is ***not*** a component of :

(1) Cytochromes (2) Peroxidases

(3) Catalases (4) Carbonic anhydrases

109. An organism is respiring in a bell jar filled with $^{18}O_2$. Which product of the respiration will contain labelled O_2 ?

(1) CO_2 (2) H_2O

(3) Both of them (4) None of them

110. During photorespiration, the conversion of phosphoglycolate to glycolate takes place in which cell organelle ?

(1) Peroxisome (2) Glyoxysome

(3) Mitochondria (4) Chloroplast

111. Fixation of one molecule of CO_2 by Calvin-Benson cycle requires :

(1) 3 ATP and 2 NADPH + H^+

(2) 5 ATP and 2 NADPH + H^+

(3) 12 ATP and 12 NADPH + H^+

(4) 18 ATP and 12 NADPH + H^+

112. Photoperiodic stimulus for flowering is perceived by :

(1) Shoot tips (2) Leaves (3) Flowers (4) Roots

113. Embryo sac is equivalent to :

(1) Megaspore (2) Integumented megasporangium

(3) Female gametophyte (4) Fruit

114. The condition where flowers do not open is known as :

(1) Chasmogamous (2) Cleistogamous

(3) Geitonogamy (4) Autogamy

115. The coding sequences in eukaryotic DNA are known as :

(1) Recon (2) Exon (3) Intron (4) Mucon

116. The F_2 generation offsprings in a plant showing incomplete dominance, exhibit :

(1) Variable genotypic and phenotypic ratios

(2) A phenotypic ratio of 3 : 1

(3) A genotypic ratio of 1 : 1

(4) Similar genotypic and phenotypic ratio of 1 : 2 : 1

117. Diabetes insipidus is caused by deficient secretion of :

(1) Insulin (2) Glucagon (3) Vassopresin (4) Oxytocin

118. DOTS strategy is used to treat :

(1) HIV (2) Malaria (3) Tuberculosis (4) Hepatitis

119. Which of the following microbe is used as biopesticide ?

(1) *Agrobacterium tumefaciens*

(2) *Bacillus thuringiensis*

(3) *Agrobacterium rhizogenes*

(4) *Bacillus amyloliquefaciens*

120. Organisms called methanogens are most abundant in a :

(1) Hot spring
(2) Sulphur rock
(3) Cattle yard
(4) Polluted stream

121. In coming years, the skin diseases will be more common due to :

(1) Increase in air pollution
(2) Increase in CO_2
(3) Excess use of detergents
(4) Depletion of Ozone

122. Which biogeochemical cycle is ***not*** gaseous ?

(1) Carbon cycle
(2) Nitrogen cycle
(3) Phosphorous cycle
(4) Sulfur cycle

123. If the number of chromosomes in the endosperm cells of a plant are 21 chromosomes, what will be the number of chromosomes in the gametes ?

(1) 21
(2) 14
(3) 7
(4) 44

124. Ovulation occurs under the influence of :

(1) LH
(2) FSH
(3) Estrogen
(4) Progesteron

125. Organ of corti occurs in :

(1) External ear
(2) Middle ear
(3) Cochlea
(4) Retina

126. Bile is released by the action of :

(1) Gastrin
(2) Secretin
(3) Cholecystokinin
(4) Insulin

127. Uricotelic excretion is mainly an adaptation for :

(1) Conservation of urea producing enzyme

(2) Raising osmotic concentration of blood

(3) Conservation of water

(4) Storage of waste materials

128. DNA sequence is ATG. What would be the sequence of bases in anticodon of tRNA ?

(1) ATG (2) UAC

(3) TAC (4) AUG

129. Who proposed the 'theory of mutation' ?

(1) J. B. de Lamarck (2) A. Weisman

(3) Hugo de Vries (4) A. I. Oparin

130. Red data book provides data on :

(1) Biota of red sea

(2) Effect of red light on photosynthesis

(3) Red pigmented plants

(4) Threatened species

Total No. of Printed Pages : 21

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BPH-EE-2016(SET-Z)

B

11494

Sr. No. .....

Time : **1¼ Hours (75 minutes)** Total Questions : **130** Max. Marks : **100**

Candidate's Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Roll No. (in figures) _____ (in words) _____

Date of Exam : _____

_____ _____

(Signature of the Invigilator) (Signature of the Candidate)

CANDIDATES MUST READ THE FOLLOWING INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER & FOLLOW THEM.

1. All questions under **Part – A** and **Part – B** are ***compulsory***. **Part – C** is optional. The candidates may attempt either Optional **Part – C(i) OR** Optional **Part – C(ii)**. All questions carry equal marks i.e. ***one*** mark each.
2. The candidates ***must return*** this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself.
4. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing ***within two hours*** after the test is over. No such complaint(s) will be entertained thereafter.
5. ***Use only blue or black ball point pen of good quality in the OMR Answer-Sheet.***
6. There will be ***no negative*** marking. Each correct answer will be awarded ***one*** full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. *Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after the start of examination.*

PART – A

PHYSICS

1. The ratio of frequencies of the long wavelength limits of the Balmer and Lyman series of hydrogen is :

   (1) 27 : 5 (2) 5 : 27

   (3) 4 : 1 (4) 1 : 4

2. The ratio of half-life to the mean life of a radioactive sample with decay constant λ :

   (1) 0.693 (2) $\sqrt{0.693}$

   (3) 1/0.693 (4) $(0.693)^2$

3. The forbidden energy gap of Si and Ge respectively is :

   (1) 1 eV, 2 eV (2) 1.5 eV, 3.0 eV

   (3) 1.11 eV, 0.7 eV (4) 0.7 eV, 1.11 eV

4. In a CE amplifier if the value of i_c/i_e is 0.98, then the value of β will be :

   (1) 98 (2) 0.98 (3) 49 (4) 1.96

5. The spectrum of a star is usually :

   (1) continuous emission spectrum (2) continuous absorption spectrum

   (3) line absorption spectrum (4) line emission spectrum

6. A circular flexible loop of wire of radius r carrying a current I is placed in a uniform magnetic field B. If B is doubled, the tension in the loop :

   (1) is unchanged (2) is doubled

   (3) is halved (4) is quadrupled

7. The magnetic moment of a diamagnetic atom is :

   (1) zero (2) ∞ (3) $-\infty$ (4) 1.08

8. The sum and difference of the self inductances of two coils are 13 H and 5 H respectively. The maximum mutual inductances of the two coils is :

(1) 6 H (2) 5 H

(3) $\sqrt{65}$ H (4) 18 H

9. A current I = 3 + 8 sin 100t is passing through a resistor of resistance 10 Ω. The effective value of the current is :

(1) 5 A (2) 10 A

(3) $4\sqrt{2}$ A (4) $3\sqrt{2}$ A

10. If the work function of a metal is 10 eV and is subjected to bombardment by photons of 20 eV, then the frequency of photoelectrons will be :

(1) $= 10/h$ (2) $> 10/h$

(3) $< 10/h$ (4) $\geq 10/h$

SEAL

11. If a stone is dropped into a lake from the top of a tower, the sound of the splash is heard by a man on the tower after 11.5 seconds. The height of the tower is :

(1) 1000 m (2) 750 m

(3) 500 m (4) 250 m

12. The average value of which of the following quantities is zero for the molecule of an ideal gas in equilibrium :

(1) Kinetic energy (2) Momentum

(3) Density (4) Speed

13. If three moles of an ideal gas are compressed to half the initial volume at a constant temperature of 300 K, the amount of work done is :

(1) – 5188 J (2) 5000 J

(3) 5188 J (4) – 5000 J

14. A telescope consists of two lenses of focal length 10 cm and 1 cm. Calculate the length of the telescope, when an object is kept at a distance of 60 cm from the objective then the final image is formed at least distance of distinct vision :

(1) 15.05 cm (2) 12.96 cm

(3) 13.63 cm (4) 14.44 cm

15. At the eight corners of a cube of side 10 cm, equal charges each of value 10 C are placed. The resulting potential at the centre of the cube is :

(1) 83.11×10^{11} V (2) 16.62×10^{11} V

(3) 1.66×10^{11} V (4) 1662.77×10^{11} V

16. The centre of mass of a system cannot change its state of motion, unless there is an external force acting on it. Yet the internal force of the brakes can bring a car to rest. Then :

(1) the brakes stop the vehicle

(2) the friction between brake pads and the wheel stops the car

(3) the car is stopped by the road

(4) the car is stopped by the driver pressing the pedal

17. If the momentum of a body remains constant, then the mass-speed graph of the body is a :

(1) circle (2) straight line

(3) rectangular hyperbola (4) parabola

18. A body of mass M moving with a speed u has a head-on collision with a body of mass m at rest. If M >> m, the speed of the body with mass m after the collision will be nearly :

(1) um/M (2) uM/m (3) u/2 (4) 2u

19. If a body moves through a distance greater than $2\pi R$ in one full rotation, then :

(1) $v_{cm} > R\omega$ (2) $v_{cm} < R\omega$ (3) $v_{cm} \geq R\omega$ (4) $v_{cm} \leq R\omega$

20. The work done by an external agent to shift a point mass from infinity to the centre o earth is :

(1) zero
(2) greater than zero
(3) less than zero
(4) ≤ 0

21. A uniform chain of length l is suspended with lower end just touching a horizontal table. Find the pressure on the table, when a length has reached the table :

(1) mgx (2) 2mgx (3) 3mgx (4) mgx/2

22. Fine particle of a substance are to be stored in a heap on a horizontally circular plate of radius a. If the coefficient of static friction between the particles is k, the maximum possible height of the cone will be :

(1) ak
(2) $ak/2$
(3) a/k
(4) ak^2

23. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb line is suspended from the roof of the car by a light rigid rod of length 1 m. The angle made by the rod with the track is :

(1) zero (2) 30° (3) 45° (4) 60°

24. If a compressed string is dissolved in acid :

(1) the energy of the string increases
(2) the energy of the acid decreases
(3) the kinetic energy and potential energy of the acid molecules increases
(4) the temperature of the acid increases

25. The power supplied by a force acting on a particle moving in a straight line is constant. The velocity of the particle varies with displacement as :

(1) $\sqrt{x}$
(2) x
(3) x^2
(4) $x^{1/3}$

26. The dimensions of solar constant which relates to the energy received by the earth are :

(1) $[ML^2 T^{-3}]$ (2) $[M^2 L^0 T^{-1}]$ (3) $[ML^0 T^{-3}]$ (4) $[ML^1 T^{-2}]$

27. If the speed of light is 3×10^{10} cm sec^{-1}, the distance travelled by the light in one light year in meters is :

(1) 3×10^{12} (2) 9.461×10^{15}

(3) 3×10^{15} (4) 3.126×10^{14}

28. If a car travels 4 km towards north at an angle of 45° to the east and then travels a distance of 2 km towards north at an angle of 135° to the east, the total distance travelled by the car in km is :

(1) 6 (2) 8 (3) 5.64 (4) 4.95

29. If $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$ and θ increases at a uniform rate ω, then the velocity of the particle is :

(1) $a\omega$ (2) $a^2\theta/\omega$ (3) $a\theta/\omega$ (4) $a\theta\omega$

30. If the velocity of a moving particle, $v = x^n$ where x is the displacement, then :

(1) when $x = 0$, the velocity and acceleration are zero

(2) for the body in motion, $n > 1/2$

(3) for the body in motion, $n < 1/2$

(4) both (1) and (2)

31. The time period of a simple pendulum at the centre of earth is :

(1) zero (2) infinity

(3) less than zero (4) none of the three before

32. In an experiment, a capillary tube is kept vertical and the water rises upto 3 mm height in the tube. When the tube is tilted at an angle of 60° with the vertical, the height of the water will be :

(1) 6 mm (2) 4 mm (3) 3 mm (4) 4.5 mm

33. The energy required to increase the radius of a soap bubble from 1 cm to 2 cm, assuming surface tension to be 30 dyne cm^{-1}, is :

(1) 240π ergs (2) 720π ergs

(3) 480π ergs (4) 120π ergs

34. The bulk modulus for an incompressible liquid is :

(1) ∞ (2) 0 (3) 1 (4) 2

35. A transverse wave with speed 3000 m sec^{-1} passes along a stretched wire. If the tension in the wire increases four times, then the velocity of the wave is :

(1) 1500 m sec^{-1} (2) 3000 m sec^{-1}

(3) 6000 m sec^{-1} (4) 9000 m sec^{-1}

PART – B

CHEMISTRY

36. The vitamin which is neither soluble in water nor in fat is :

(1) Phylloquinone (2) Biotin

(3) Thiamine (4) Ergocalciferol

37. Violet colour is obtain when dilute $CuSO_4$ is added in an alkaline solution of protein. The test is known as :

(1) Biuret test (2) Xanthoproteic test

(3) Million's test (4) Ninhydrin test

38. The hormone that helps in conversion of glucose in glycogen is :

(1) Cortisone (2) Calcitonin

(3) Adrenaline (4) Insulin

39. Which of the following is used as "a morning after pill" ?

(1) Norethindrone (2) Ethynylestradiol

(3) Mifepristone (4) Bithional

40. Barbituric acid and its derivatives are well known as :

(1) Tranquilizers (2) Antiseptics

(3) Analgesics (4) Antipyretics

41. Phenol $\xrightarrow{1.\,NaOH\ \ 2.\,CO_2/140°C} A \xrightarrow{H^+/H_2O} B \xrightarrow{Ac_2O} C$

In this reaction, the end product is :

(1) Salicylaldehyde (2) Salicylic acid

(3) Phenyl acetate (4) Aspirin

42. Malonic acid on heating gives :

(1) Formic acid (2) Acetic acid (3) Oxalic acid (4) Acetaldehyde

43. An organic compound (A) on reduction gives compound (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N-methylaniline. The compound (A) is :

(1) Methylamine (2) Nitromethane (3) Aniline (4) Nitrobenzene

44. Keratin, a structural protein is present in :

(1) Hair (2) Skin (3) Wool (4) All of these

45. In DNA, the complimentary bases are :

(1) Adenine and thymine; guanine and uracil

(2) Adenine and thymine; guanine and cytosine

(3) Adenine and guanine; thymine and uracil

(4) Adenine and uracil; guanine and cytosine

46. The set with correct order of acidity is :

(1) $HClO < HClO_2 < HClO_3 < HClO_4$

(2) $HClO_4 < HClO_3 < HClO_2 < HClO$

(3) $HClO < HClO_4 < HClO_3 < HClO_2$

(4) $HClO_4 < HClO_2 < HClO_3 < HClO$

47. The gas obtained when bleaching powder is treated with warm concentrated solution of NH_3 is :

(1) Cl_2 (2) N_2 (3) NO (4) H_2

48. When SO_2 is passed through acidified $K_2Cr_2O_7$ solution :

(1) The solution turns blue (2) The solution is decolorized

(3) The solution turns green (4) SO_2 is reduced

49. The complex used as an anticancer agent is :

(1) mer – $[Co(NH_3)_3Cl_3]$ (2) Cis – $[PtCl_2(NH_3)_2]$

(3) Cis – $K_2[PtCl_2Br_2]$ (4) Na_2CoCl_4

50. Which is ***not*** an organometallic compound ?

(1) C_3H_7MgI (2) C_2H_5ONa

(3) $(C_2H_5)_3Al$ (4) TEL

51. Pyrosilicate ion is :

(1) SiO_2^{2-} (2) SiO_4^{2-}

(3) $Si_2O_6^{7-}$ (4) $Si_2O_7^{6-}$

52. Ethylene reacts with sulphur monochloride to give :

(1) Phosgene (2) Mustard gas

(3) Ethylene chloride (4) None of these

53. Which one of the following regions of atmosphere contains Ozone ?

(1) Troposphere
(2) Thermosphere
(3) Mesosphere
(4) Stratosphere

54. Azeotropic mixtures are :

(1) Constant boiling mixture
(2) Those which boil at different temp.
(3) Mixture of two solids
(4) None of these

55. An example of Frenkel as well as Schottky defect is :

(1) *NaBr*
(2) *TlBr*
(3) *AgBr*
(4) *CuBr*

56. Entropy of vaporization of water at 100°C, if molar heat of vaporization is 9710 Cal mol^{-1} will be :

(1) 20 Cal mol^{-1} K^{-1}
(2) 26 Cal mol^{-1} K^{-1}
(3) 24 Cal mol^{-1} K^{-1}
(4) 28 Cal mol^{-1} K^{-1}

57. 1 mole of N_2 and 2 moles of H_2 are allowed to react in a 1 dm^3 vessel. At equilibrium 0.8 mole of NH_3 is formed. The concentration of H_2 in the vessel is :

(1) 0.6 M
(2) 0.8 M
(3) 0.2 M
(4) 0.4 M

58. Which is most powerful reducing agent ?

(1) Molecular hydrogen
(2) Atomic hydrogen
(3) Nascent hydrogen
(4) All have same reducing power

59. Lithium is the strongest reducing agent among alkali metals due to which of the following factor ?

(1) Ionization energy
(2) Electron affinity
(3) Hydration energy
(4) Lattice energy

60. Potassium is stored under :

(1) Water
(2) Ethyl alcohol
(3) Liquid ammonia
(4) Kerosene

61. How many molecules are present in one gram of hydrogen ?

(1) 6.02×10^{23}
(2) 3.01×10^{23}
(3) 2.5×10^{23}
(4) 1.5×10^{23}

62. The de-Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is :

(1) 6.63×10^{-33} m
(2) 6.63×10^{-34} m
(3) 6.63×10^{-35} m
(4) 6.63×10^{-36} m

63. Which of the following is correct order of size ?

(1) $I > I^- > I^+$
(2) $I > I^+ > I^-$
(3) $I^+ > I^- > I$
(4) $I^- > I > I^+$

64. IF_5 has the following hybridization :

(1) sp^3d^2
(2) sp^3d^3
(3) sp^3d
(4) none of these

65. Absolute zero is the temperature at which :

(1) Rotational motion ceases
(2) Volume become zero
(3) Mass become zero
(4) None of these

66. Which of the following substance acts as superconductor at 4 K ?

(1) *Hg*
(2) *Cu*
(3) *Na*
(4) *Mg*

67. In fireflies the flashes are produced due to combustion of a protein luciferin in air and moisture. The phenomenon is known as :

(1) Photochemical change
(2) Photo combustion
(3) Chemiluminescence
(4) None of these

68. For the Coagulation of 100 mL of arsenious sol, 5 mL of 1 M NaCl is required. The flocculation value of *NaCl* is :

(1) 5 (2) 50 (3) 25 (4) 1

69. A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14}\ s^{-1}$. The half-life of the reaction is :

(1) 1.26×10^{13} s
(2) 1.26×10^{-13} s
(3) 5.5×10^{13} s
(4) 5.5×10^{-13} s

70. Which of the following is ***not*** a metal refining process ?

(1) Baeyer's process
(2) Mond process
(3) Van Arkel process
(4) Liquation process

OPTIONAL

PART – C (i)

MATHEMATICS

71. The area of the region lying between the line $x - y + 2 = 0$ and the curve $x = \sqrt{y}$ is :

(1) 4/3 (2) 5/4 (3) 9/2 (4) 10/3

72. If $f(x) = f'(x)$ and $f(1) = 2$, then $f(3) =$

(1) $2e^2$ (2) $3e^2$ (3) $2e^3$ (4) $\frac{e^2}{3}$

73. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{c} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent vectors and $|\vec{c}| = \sqrt{3}$, then :

(1) $\alpha = 1, \beta = \pm 1$
(2) $\alpha = \pm 1, \beta = 1$
(3) $\alpha = -1, \beta = \pm 1$
(4) $\alpha = \pm 1, \beta = -1$

74. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the curve $xy = c^2$, $z = 0$ then $c =$

(1) $\pm\sqrt{5}$ (2) $\pm\sqrt{3}$

(3) $\pm\frac{1}{3}$ (4) $\pm\frac{\sqrt{5}}{2}$

75. A coin is tossed three times, the probability of getting head and tail alternately is :

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

76. If the tangent to the curve $x = a(\theta + \sin\theta)$, $y = a(1 + \cos\theta)$ at $\theta = \pi/3$ makes an angle α with the x-axis, then $\alpha =$

(1) $\pi/6$ (2) $\pi/2$ (3) $5\pi/6$ (4) $2\pi/3$

77. The value of K for which the function $f(x) = K\sin x + \frac{1}{3}\sin 3x$ has an extremum at $x = \pi/3$ is :

(1) 0 (2) 1 (3) 2/3 (4) 2

78. The function $f(x) = x + \cot^{-1} x$ increases in the interval :

(1) $(-\infty, \infty)$ (2) $(-1, \infty)$ (3) $(1, \infty)$ (4) $[0, \infty)$

79. $\int \frac{x+\sin x}{1+\cos x}\,dx =$

(1) $\tan\frac{x}{2}+c$ (2) $x\tan\frac{x}{2}+c$

(3) $\cot\frac{x}{2}+c$ (4) $x\cot\frac{x}{2}+c$

80. $\int_0^{\log 5} \frac{e^x\sqrt{e^x-1}}{e^x+3}\,dx =$

(1) $2+\pi$ (2) $3-\pi$ (3) $4-\pi$ (4) $3+2\pi$

81. If A and B are two non-empty sets, then $A \cap (B \cup A)' =$

(1) ϕ (2) A

(3) B (4) Not defined

82. If $f(x) = 3^x$, then f(0), f(1), f(2) ..... are in :

(1) AP (2) GP

(3) HP (4) AG series

83. The value of $\frac{1-\tan^2 15^\circ}{1+\tan^2 15^\circ}$ is :

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

84. Which of the following statements is incorrect ?

(1) $\cos\theta = \frac{2}{5}$ (2) $\sin\theta = -\frac{1}{3}$

(3) $\sec\theta = \frac{1}{2}$ (4) $\tan\theta = 6$

85. For any complex number z, the minimum value of $|z| + |z-1|$ is :

(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) $\frac{2}{3}$

86. If the x-coordinate of a point P on the join of A(2, 2, 1) and B(5, 1, –2) is 4, then its y–coordinate is :

(1) 2 (2) $\frac{3}{2}$ (3) $\frac{4}{3}$ (4) -2

87. The value of $\lim_{x\to 0} \frac{\sqrt{1-\cos x^2}}{1-\cos x}$ is :

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

88. If $x^y = e^{x-y}$, then $\frac{dy}{dx} =$

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

(3) $\frac{1}{1+\log x}$ (4) $\frac{\log x}{1+\log x}$

89. Mean square deviation of a distribution is least when deviations are taken about :

(1) mode (2) mean (3) median (4) zero

90. Two players play a game where each of them is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial is :

(1) $\frac{1}{5}$ (2) $\frac{19}{25}$ (3) $\frac{1}{25}$ (4) $\frac{24}{25}$

91. If ${}^nP_r = 120\ {}^nC_r$, then the value of r is :

(1) 4 (2) 5 (3) 6 (4) 7

92. The number of terms in the expansion of $(1+\sqrt{2}x)^9 + (1-\sqrt{2}x)^9$ is :

(1) 10 (2) 9 (3) 8 (4) 5

93. If $a = 1 + x + x^2 + \ldots\ldots\ldots \infty$ and $b = 1 + y + y^2 + \ldots\ldots\ldots \infty$ where x and y are proper fractions, then $1 + xy + x^2y^2 + \ldots\ldots\ldots \infty$ is equal to :

(1) $\frac{ab}{a+b-1}$ (2) $\frac{ab}{a+b}$ (3) $\frac{ab}{a-b}$ (4) $\frac{a+b}{a-b}$

94. A straight line passes through (2, 2) and is perpendicular to the line $3x + y = 3$. Its y-intercept is :

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$ (3) $\frac{3}{4}$ (4) $\frac{4}{3}$

95. The line $x + y = 2$ is a normal to the parabola $y^2 = 8x$ at the point :

(1) (2, 4) (2) (– 2, 4) (3) (4, 2) (4) (3, 2)

96. If $f : R \to R$ is a mapping defined by $f(x) = x^3 + 3$, then $f^{-1}(x)$ is equal to :

(1) $(x + 3)^{1/3}$ (2) $(x - 3)^{1/3}$

(3) $(3 - x)^{1/3}$ (4) $(x^3 + 3)^{-1}$

97. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1}x\right) = 1$, then $x =$

(1) 0 (2) $\frac{4}{5}$ (3) $\frac{3}{5}$ (4) $\frac{1}{5}$

98. If A and B are symmetric matrices of the same order then AB – BA is :

(1) Unit matrix (2) Symmetric matrix

(3) Skew-symmetric matrix (4) Null matrix

99. The value of the determinant

$$\begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha+\beta) & -\sin(\alpha+\beta) & 1 \end{vmatrix}$$ is :

(1) Independent of β (2) Independent of α

(3) Independent of α and β (4) Zero

100. If $y = x + e^x$, then $\frac{d^2x}{dy^2} =$

(1) $\frac{-e^x}{(1+e^x)^3}$ (2) $\frac{-e^x}{(1+e^x)^2}$

(3) $\frac{1}{(1+e^x)^2}$ (4) $\frac{e^x}{1+e^x}$

OPTIONAL

PART – C (ii)

BIOLOGY

101. Bile is released by the action of :

(1) Gastrin (2) Secretin

(3) Cholecystokinin (4) Insulin

102. Uricotelic excretion is mainly an adaptation for :

(1) Conservation of urea producing enzyme

(2) Raising osmotic concentration of blood

(3) Conservation of water

(4) Storage of waste materials

103. DNA sequence is ATG. What would be the sequence of bases in anticodon of tRNA ?

(1) ATG (2) UAC

(3) TAC (4) AUG

104. Who proposed the 'theory of mutation' ?

(1) J. B. de Lamarck (2) A. Weisman

(3) Hugo de Vries (4) A. I. Oparin

105. Red data book provides data on :

(1) Biota of red sea

(2) Effect of red light on photosynthesis

(3) Red pigmented plants

(4) Threatened species

106. In coming years, the skin diseases will be more common due to :

(1) Increase in air pollution

(2) Increase in CO_2

(3) Excess use of detergents

(4) Depletion of Ozone

107. Which biogeochemical cycle is ***not*** gaseous ?

(1) Carbon cycle (2) Nitrogen cycle

(3) Phosphorous cycle (4) Sulfur cycle

108. If the number of chromosomes in the endosperm cells of a plant are 21 chromosomes, what will be the number of chromosomes in the gametes ?

(1) 21 (2) 14 (3) 7 (4) 44

109. Ovulation occurs under the influence of :

(1) LH (2) FSH

(3) Estrogen (4) Progesteron

110. Organ of corti occurs in :

(1) External ear (2) Middle ear

(3) Cochlea (4) Retina

111. Viroids are :

(1) ssRNA not enclosed by protein coat

(2) ssRNA enclosed by protein coat

(3) dsRNA enclosed by protein coat

(4) dsDNA enclosed by protein coat

112. The seedless vascular plants are :

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120. The coding sequences in eukaryotic DNA are known as :

(1) Recon (2) Exon (3) Intron (4) Mucon

121. A disaccharide made up of two glucose units is :

(1) Sucrose (2) Maltose (3) Lactose (4) Dextrin

122. A cell organelle which is bounded by a single membrane and contains enzymes involved in conversion of fat to carbohydrate is :

(1) Spherosomes (2) Lysosomes (3) Glyoxysomes (4) Peroxisomes

123. Iron is ***not*** a component of :

(1) Cytochromes
(2) Peroxidases
(3) Catalases
(4) Carbonic anhydrases

124. An organism is respiring in a bell jar filled with $^{18}O_2$. Which product of the respiration will contain labelled O_2 ?

(1) CO_2
(2) H_2O
(3) Both of them
(4) None of them

125. During photorespiration, the conversion of phosphoglycolate to glycolate takes place in which cell organelle ?

(1) Peroxisome
(2) Glyoxysome
(3) Mitochondria
(4) Chloroplast

126. The F_2 generation offsprings in a plant showing incomplete dominance, exhibit :

(1) Variable genotypic and phenotypic ratios

(2) A phenotypic ratio of 3 : 1

(3) A genotypic ratio of 1 : 1

(4) Similar genotypic and phenotypic ratio of 1 : 2 : 1

127. Diabetes insipidus is caused by deficient secretion of :

(1) Insulin (2) Glucagon (3) Vassopresin (4) Oxytocin

128. DOTS strategy is used to treat :

(1) HIV (2) Malaria (3) Tuberculosis (4) Hepatitis

129. Which of the following microbe is used as biopesticide ?

(1) *Agrobacterium tumefaciens*

(2) *Bacillus thuringiensis*

(3) *Agrobacterium rhizogenes*

(4) *Bacillus amyloliquefaciens*

130. Organisms called methanogens are most abundant in a :

(1) Hot spring (2) Sulphur rock

(3) Cattle yard (4) Polluted stream

Total No. of Printed Pages : 21

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BPH-EE-2016(SET-Z)

C

Sr. No. 11491

Time : **1¼ Hours (75 minutes)** Total Questions : **130** Max. Marks : **100**

Candidate's Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Roll No. (in figures) _____ (in words) _____

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_____ _____

(Signature of the Invigilator) (Signature of the Candidate)

CANDIDATES MUST READ THE FOLLOWING INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER & FOLLOW THEM.

1. All questions under **Part – A** and **Part – B** are ***compulsory***. **Part – C** is optional. The candidates may attempt either Optional **Part – C(i) OR** Optional **Part – C(ii)**. All questions carry equal marks i.e. ***one*** mark each.
2. The candidates ***must return*** this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself.
4. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing ***within two hours*** after the test is over. No such complaint(s) will be entertained thereafter.
5. ***Use only blue or black ball point pen of good quality in the OMR Answer-Sheet.***
6. There will be ***no negative*** marking. Each correct answer will be awarded ***one*** full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. *Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after the start of examination.*

C

PART – A

PHYSICS

1. A circular flexible loop of wire of radius r carrying a current I is placed in a uniform magnetic field B. If B is doubled, the tension in the loop :

(1) is unchanged (2) is doubled

(3) is halved (4) is quadrupled

2. The magnetic moment of a diamagnetic atom is :

(1) zero (2) ∞

(3) $-\infty$ (4) 1.08

3. The sum and difference of the self inductances of two coils are 13 H and 5 H respectively. The maximum mutual inductances of the two coils is :

(1) 6 H (2) 5 H

(3) $\sqrt{65}$ H (4) 18 H

4. A current I = 3 + 8 sin 100t is passing through a resistor of resistance 10 Ω. The effective value of the current is :

(1) 5 A (2) 10 A

(3) $4\sqrt{2}$ A (4) $3\sqrt{2}$ A

5. If the work function of a metal is 10 eV and is subjected to bombardment by photons of 20 eV, then the frequency of photoelectrons will be :

(1) $= 10/h$ (2) $> 10/h$

(3) $< 10/h$ (4) $\geq 10/h$

6. If a stone is dropped into a lake from the top of a tower, the sound of the splash is heard by a man on the tower after 11.5 seconds. The height of the tower is :

(1) 1000 m (2) 750 m (3) 500 m (4) 250 m

7. The average value of which of the following quantities is zero for the molecule of an ideal gas in equilibrium :

(1) Kinetic energy
(2) Momentum
(3) Density
(4) Speed

8. If three moles of an ideal gas are compressed to half the initial volume at a constant temperature of 300 K, the amount of work done is :

(1) – 5188 J
(2) 5000 J
(3) 5188 J
(4) – 5000 J

9. A telescope consists of two lenses of focal length 10 cm and 1 cm. Calculate the length of the telescope, when an object is kept at a distance of 60 cm from the objective then the final image is formed at least distance of distinct vision :

(1) 15.05 cm
(2) 12.96 cm
(3) 13.63 cm
(4) 14.44 cm

10. At the eight corners of a cube of side 10 cm, equal charges each of value 10 C are placed. The resulting potential at the centre of the cube is :

(1) 83.11×10^{11} V
(2) 16.62×10^{11} V
(3) 1.66×10^{11} V
(4) 1662.77×10^{11} V

11. The time period of a simple pendulum at the centre of earth is :

(1) zero
(2) infinity
(3) less than zero
(4) none of the three before

12. In an experiment, a capillary tube is kept vertical and the water rises upto 3 mm height in the tube. When the tube is tilted at an angle of 60° with the vertical, the height of the water will be :

(1) 6 mm
(2) 4 mm
(3) 3 mm
(4) 4.5 mm

13. The energy required to increase the radius of a soap bubble from 1 cm to 2 cm, assuming surface tension to be 30 dyne cm^{-1}, is :

(1) 240π ergs
(2) 720π ergs
(3) 480π ergs
(4) 120π ergs

20. The power supplied by a force acting on a particle moving in a straight line i constant. The velocity of the particle varies with displacement as :

(1) $\sqrt{x}$ (2) x

(3) x^2 (4) $x^{1/3}$

21. The dimensions of solar constant which relates to the energy received by the earth are :

(1) $[ML^2 T^{-3}]$ (2) $[M^2 L^0 T^{-1}]$ (3) $[ML^0 T^{-3}]$ (4) $[ML^1 T^{-2}]$

22. If the speed of light is 3×10^{10} cm sec^{-1}, the distance travelled by the light in one light year in meters is :

(1) 3×10^{12} (2) 9.461×10^{15}

(3) 3×10^{15} (4) 3.126×10^{14}

23. If a car travels 4 km towards north at an angle of 45° to the east and then travels a distance of 2 km towards north at an angle of 135° to the east, the total distance travelled by the car in km is :

(1) 6 (2) 8 (3) 5.64 (4) 4.95

24. If $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$ and θ increases at a uniform rate ω, then the velocity of the particle is :

(1) $a\omega$ (2) $a^2\theta/\omega$ (3) $a\theta/\omega$ (4) $a\theta\omega$

25. If the velocity of a moving particle, $v = x^n$ where x is the displacement, then :

(1) when $x = 0$, the velocity and acceleration are zero

(2) for the body in motion, $n > 1/2$

(3) for the body in motion, $n < 1/2$

(4) both (1) and (2)

26. The ratio of frequencies of the long wavelength limits of the Balmer and Lyman series of hydrogen is :

(1) 27 : 5 (2) 5 : 27

(3) 4 : 1 (4) 1 : 4

27. The ratio of half-life to the mean life of a radioactive sample with decay constant λ :

(1) 0.693 (2) $\sqrt{0.693}$

(3) 1/0.693 (4) $(0.693)^2$

28. The forbidden energy gap of Si and Ge respectively is :

(1) 1 eV, 2 eV (2) 1.5 eV, 3.0 eV

(3) 1.11 eV, 0.7 eV (4) 0.7 eV, 1.11 eV

29. In a CE amplifier if the value of i_c/i_e is 0.98, then the value of β will be :

(1) 98 (2) 0.98

(3) 49 (4) 1.96

30. The spectrum of a star is usually :

(1) continuous emission spectrum (2) continuous absorption spectrum

(3) line absorption spectrum (4) line emission spectrum

31. The centre of mass of a system cannot change its state of motion, unless there is an external force acting on it. Yet the internal force of the brakes can bring a car to rest. Then :

(1) the brakes stop the vehicle

(2) the friction between brake pads and the wheel stops the car

(3) the car is stopped by the road

(4) the car is stopped by the driver pressing the pedal

39. Keratin, a structural protein is present in :

(1) Hair (2) Skin (3) Wool (4) All of these

40. In DNA, the complimentary bases are :

(1) Adenine and thymine; guanine and uracil

(2) Adenine and thymine; guanine and cytosine

(3) Adenine and guanine; thymine and uracil

(4) Adenine and uracil; guanine and cytosine

41. The set with correct order of acidity is :

(1) $HClO < HClO_2 < HClO_3 < HClO_4$

(2) $HClO_4 < HClO_3 < HClO_2 < HClO$

(3) $HClO < HClO_4 < HClO_3 < HClO_2$

(4) $HClO_4 < HClO_2 < HClO_3 < HClO$

42. The gas obtained when bleaching powder is treated with warm concentrated solution of NH_3 is :

(1) Cl_2 (2) N_2 (3) NO (4) H_2

43. When SO_2 is passed through acidified $K_2Cr_2O_7$ solution :

(1) The solution turns blue (2) The solution is decolorized

(3) The solution turns green (4) SO_2 is reduced

44. The complex used as an anticancer agent is :

(1) mer – $[Co(NH_3)_3Cl_3]$ (2) Cis – $[PtCl_2(NH_3)_2]$

(3) Cis – $K_2[PtCl_2Br_2]$ (4) Na_2CoCl_4

45. Which is ***not*** an organometallic compound ?

(1) C_3H_7MgI (2) C_2H_5ONa

(3) $(C_2H_5)_3Al$ (4) TEL

53. Which is most powerful reducing agent ?

(1) Molecular hydrogen (2) Atomic hydrogen

(3) Nascent hydrogen (4) All have same reducing power

54. Lithium is the strongest reducing agent among alkali metals due to which of the following factor ?

(1) Ionization energy (2) Electron affinity

(3) Hydration energy (4) Lattice energy

55. Potassium is stored under :

(1) Water (2) Ethyl alcohol

(3) Liquid ammonia (4) Kerosene

56. How many molecules are present in one gram of hydrogen ?

(1) 6.02×10^{23} (2) 3.01×10^{23}

(3) 2.5×10^{23} (4) 1.5×10^{23}

57. The de-Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is :

(1) 6.63×10^{-33} m (2) 6.63×10^{-34} m

(3) 6.63×10^{-35} m (4) 6.63×10^{-36} m

58. Which of the following is correct order of size ?

(1) $I > I^- > I^+$ (2) $I > I^+ > I^-$

(3) $I^+ > I^- > I$ (4) $I^- > I > I^+$

59. IF_5 has the following hybridization :

(1) sp^3d^2 (2) sp^3d^3

(3) sp^3d (4) none of these

60. Absolute zero is the temperature at which :

(1) Rotational motion ceases
(2) Volume become zero
(3) Mass become zero
(4) None of these

61. The vitamin which is neither soluble in water nor in fat is :

(1) Phylloquinone
(2) Biotin
(3) Thiamine
(4) Ergocalciferol

62. Violet colour is obtain when dilute $CuSO_4$ is added in an alkaline solution of protein The test is known as :

(1) Biuret test
(2) Xanthoproteic test
(3) Million's test
(4) Ninhydrin test

63. The hormone that helps in conversion of glucose in glycogen is :

(1) Cortisone
(2) Calcitonin
(3) Adrenaline
(4) Insulin

64. Which of the following is used as "a morning after pill" ?

(1) Norethindrone
(2) Ethynylestradiol
(3) Mifepristone
(4) Bithional

65. Barbituric acid and its derivatives are well known as :

(1) Tranquilizers
(2) Antiseptics
(3) Analgesics
(4) Antipyretics

66. Pyrosilicate ion is :

(1) SiO_2^{2-}
(2) SiO_4^{2-}
(3) $Si_2O_6^{7-}$
(4) $Si_2O_7^{6-}$

67. Ethylene reacts with sulphur monochloride to give :

(1) Phosgene
(2) Mustard gas
(3) Ethylene chloride
(4) None of these

68. Which one of the following regions of atmosphere contains Ozone ?

(1) Troposphere
(2) Thermosphere
(3) Mesosphere
(4) Stratosphere

69. Azeotropic mixtures are :

(1) Constant boiling mixture
(2) Those which boil at different temp.
(3) Mixture of two solids
(4) None of these

70. An example of Frenkel as well as Schottky defect is :

(1) *NaBr*
(2) *TlBr*
(3) *AgBr*
(4) *CuBr*

OPTIONAL

PART – C (i)

MATHEMATICS

71. If the tangent to the curve $x = a(\theta + \sin\theta)$, $y = a(1 + \cos\theta)$ at $\theta = \pi/3$ makes an angle α with the x-axis, then $\alpha =$

(1) $\pi/6$
(2) $\pi/2$
(3) $5\pi/6$
(4) $2\pi/3$

72. The value of K for which the function $f(x) = K \sin x + \frac{1}{3}\sin 3x$ has an extremum at $x = \pi/3$ is :

(1) 0
(2) 1
(3) 2/3
(4) 2

73. The function $f(x) = x + \cot^{-1} x$ increases in the interval :

(1) $(-\infty, \infty)$ (2) $(-1, \infty)$ (3) $(1, \infty)$ (4) $[0, \infty)$

74. $\int \frac{x + \sin x}{1 + \cos x}\, dx =$

(1) $\tan \frac{x}{2} + c$ (2) $x \tan \frac{x}{2} + c$ (3) $\cot \frac{x}{2} + c$ (4) $x \cot \frac{x}{2} + c$

75. $\int_0^{\log 5} \frac{e^x \sqrt{e^x - 1}}{e^x + 3}\, dx =$

(1) $2 + \pi$ (2) $3 - \pi$ (3) $4 - \pi$ (4) $3 + 2\pi$

76. If $f : R \to R$ is a mapping defined by $f(x) = x^3 + 3$, then $f^{-1}(x)$ is equal to :

(1) $(x + 3)^{1/3}$ (2) $(x - 3)^{1/3}$

(3) $(3 - x)^{1/3}$ (4) $(x^3 + 3)^{-1}$

77. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$, then $x =$

(1) 0 (2) $\frac{4}{5}$ (3) $\frac{3}{5}$ (4) $\frac{1}{5}$

78. If A and B are symmetric matrices of the same order then AB – BA is :

(1) Unit matrix (2) Symmetric matrix

(3) Skew-symmetric matrix (4) Null matrix

79. The value of the determinant

$$\begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha+\beta) & -\sin(\alpha+\beta) & 1 \end{vmatrix}$$ is :

(1) Independent of β (2) Independent of α

(3) Independent of α and β (4) Zero

87. If $f(x) = 3^x$, then f(0), f(1), f(2) ..... are in :

(1) AP (2) GP

(3) HP (4) AG series

88. The value of $\frac{1-\tan^2 15°}{1+\tan^2 15°}$ is :

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

89. Which of the following statements is incorrect ?

(1) $\cos\theta = \frac{2}{5}$ (2) $\sin\theta = -\frac{1}{3}$

(3) $\sec\theta = \frac{1}{2}$ (4) $\tan\theta = 6$

90. For any complex number z, the minimum value of $|z| + |z-1|$ is :

(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) $\frac{2}{3}$

91. The area of the region lying between the line $x - y + 2 = 0$ and the curve $x = \sqrt{y}$ is :

(1) 4/3 (2) 5/4 (3) 9/2 (4) 10/3

92. If $f(x) = f'(x)$ and $f(1) = 2$, then $f(3) =$

(1) $2e^2$ (2) $3e^2$ (3) $2e^3$ (4) $\frac{e^2}{3}$

93. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{c} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent vectors and $|\vec{c}| = \sqrt{3}$, then :

(1) $\alpha = 1, \beta = \pm 1$ (2) $\alpha = \pm 1, \beta = 1$

(3) $\alpha = -1, \beta = \pm 1$ (4) $\alpha = \pm 1, \beta = -1$

C

94. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the curve $xy = c^2, z = 0$ then $c =$

(1) $\pm\sqrt{5}$ (2) $\pm\sqrt{3}$ (3) $\pm\frac{1}{3}$ (4) $\pm\frac{\sqrt{5}}{2}$

95. A coin is tossed three times, the probability of getting head and tail alternately is :

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

96. If the x-coordinate of a point P on the join of A(2, 2, 1) and B(5, 1, –2) is 4, then its y–coordinate is :

(1) 2 (2) $\frac{3}{2}$ (3) $\frac{4}{3}$ (4) -2

97. The value of $\lim_{x\to 0}\frac{\sqrt{1-\cos x^2}}{1-\cos x}$ is :

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

98. If $x^y = e^{x-y}$, then $\frac{dy}{dx} =$

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

(3) $\frac{1}{1+\log x}$ (4) $\frac{\log x}{1+\log x}$

99. Mean square deviation of a distribution is least when deviations are taken about :

(1) mode (2) mean (3) median (4) zero

100. Two players play a game where each of them is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial is :

(1) $\frac{1}{5}$ (2) $\frac{19}{25}$ (3) $\frac{1}{25}$ (4) $\frac{24}{25}$

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BPH-EE-2016(SET-Z)

D

Sr. No. 11492

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Date of Exam : _____

_____ _____

(Signature of the Invigilator) (Signature of the Candidate)

CANDIDATES MUST READ THE FOLLOWING INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER & FOLLOW THEM.

1. All questions under **Part – A** and **Part – B** are ***compulsory***. **Part – C** is optional. The candidates may attempt either Optional **Part – C(i) OR** Optional **Part – C(ii)**. All questions carry equal marks i.e. ***one*** mark each.
2. The candidates ***must return*** this question booklet and the OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means/misbehaviour will be registered against him/her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself.
4. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations in writing ***within two hours*** after the test is over. No such complaint(s) will be entertained thereafter.
5. ***Use only blue or black ball point pen of good quality in the OMR Answer-Sheet.***
6. There will be ***no negative*** marking. Each correct answer will be awarded ***one*** full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. *Before answering the questions, the candidates should ensure that they have been supplied correct & complete question booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after the start of examination.*

PART – A

PHYSICS

1. If a stone is dropped into a lake from the top of a tower, the sound of the splash is heard by a man on the tower after 11.5 seconds. The height of the tower is :

   (1) 1000 m (2) 750 m (3) 500 m (4) 250 m

2. The average value of which of the following quantities is zero for the molecule of an ideal gas in equilibrium :

   (1) Kinetic energy (2) Momentum

   (3) Density (4) Speed

3. If three moles of an ideal gas are compressed to half the initial volume at a constant temperature of 300 K, the amount of work done is :

   (1) – 5188 J (2) 5000 J (3) 5188 J (4) – 5000 J

4. A telescope consists of two lenses of focal length 10 cm and 1 cm. Calculate the length of the telescope, when an object is kept at a distance of 60 cm from the objective then the final image is formed at least distance of distinct vision :

   (1) 15.05 cm (2) 12.96 cm

   (3) 13.63 cm (4) 14.44 cm

5. At the eight corners of a cube of side 10 cm, equal charges each of value 10 C are placed. The resulting potential at the centre of the cube is :

   (1) 83.11×10^{11} V (2) 16.62×10^{11} V

   (3) 1.66×10^{11} V (4) 1662.77×10^{11} V

6. The time period of a simple pendulum at the centre of earth is :

   (1) zero (2) infinity

   (3) less than zero (4) none of the three before

7. In an experiment, a capillary tube is kept vertical and the water rises upto 3 mm height in the tube. When the tube is tilted at an angle of 60° with the vertical, the height of the water will be :

(1) 6 mm (2) 4 mm (3) 3 mm (4) 4.5 mm

8. The energy required to increase the radius of a soap bubble from 1 cm to 2 cm, assuming surface tension to be 30 dyne cm^{-1}, is :

(1) 240π ergs (2) 720π ergs

(3) 480π ergs (4) 120π ergs

9. The bulk modulus for an incompressible liquid is :

(1) ∞ (2) 0 (3) 1 (4) 2

10. A transverse wave with speed 3000 m sec^{-1} passes along a stretched wire. If the tension in the wire increases four times, then the velocity of the wave is :

(1) 1500 m sec^{-1} (2) 3000 m sec^{-1}

(3) 6000 m sec^{-1} (4) 9000 m sec^{-1}

11. A uniform chain of length l is suspended with lower end just touching a horizontal table. Find the pressure on the table, when a length has reached the table :

(1) mgx (2) 2mgx (3) 3mgx (4) mgx/2

12. Fine particle of a substance are to be stored in a heap on a horizontally circular plate of radius a. If the coefficient of static friction between the particles is k, the maximum possible height of the cone will be :

(1) ak (2) $ak/2$ (3) a/k (4) ak^2

13. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb line is suspended from the roof of the car by a light rigid rod of length 1 m. The angle made by the rod with the track is :

(1) zero (2) 30° (3) 45° (4) 60°

14. If a compressed string is dissolved in acid :

(1) the energy of the string increases

(2) the energy of the acid decreases

(3) the kinetic energy and potential energy of the acid molecules increases

(4) the temperature of the acid increases

15. The power supplied by a force acting on a particle moving in a straight line is constant. The velocity of the particle varies with displacement as :

(1) $\sqrt{x}$ (2) x

(3) x^2 (4) $x^{1/3}$

16. The ratio of frequencies of the long wavelength limits of the Balmer and Lyman series of hydrogen is :

(1) 27 : 5 (2) 5 : 27

(3) 4 : 1 (4) 1 : 4

17. The ratio of half-life to the mean life of a radioactive sample with decay constant λ :

(1) 0.693 (2) $\sqrt{0.693}$

(3) 1/0.693 (4) $(0.693)^2$

18. The forbidden energy gap of Si and Ge respectively is :

(1) 1 eV, 2 eV (2) 1.5 eV, 3.0 eV

(3) 1.11 eV, 0.7 eV (4) 0.7 eV, 1.11 eV

19. In a CE amplifier if the value of i_c/i_e is 0.98, then the value of β will be :

(1) 98 (2) 0.98

(3) 49 (4) 1.96

20. The spectrum of a star is usually :

(1) continuous emission spectrum

(2) continuous absorption spectrum

(3) line absorption spectrum

(4) line emission spectrum

21. A circular flexible loop of wire of radius r carrying a current I is placed in a uniform magnetic field B. If B is doubled, the tension in the loop :

(1) is unchanged

(2) is doubled

(3) is halved

(4) is quadrupled

22. The magnetic moment of a diamagnetic atom is :

(1) zero

(2) ∞

(3) $-\infty$

(4) 1.08

23. The sum and difference of the self inductances of two coils are 13 H and 5 H respectively. The maximum mutual inductances of the two coils is :

(1) 6 H

(2) 5 H

(3) $\sqrt{65}$ H

(4) 18 H

24. A current $I = 3 + 8 \sin 100t$ is passing through a resistor of resistance 10 Ω. The effective value of the current is :

(1) 5 A

(2) 10 A

(3) $4\sqrt{2}$ A

(4) $3\sqrt{2}$ A

25. If the work function of a metal is 10 eV and is subjected to bombardment by photons of 20 eV, then the frequency of photoelectrons will be :

(1) $= 10/h$

(2) $> 10/h$

(3) $< 10/h$

(4) $\geq 10/h$

26. The centre of mass of a system cannot change its state of motion, unless there is an external force acting on it. Yet the internal force of the brakes can bring a car to rest. Then :

(1) the brakes stop the vehicle

(2) the friction between brake pads and the wheel stops the car

(3) the car is stopped by the road

(4) the car is stopped by the driver pressing the pedal

27. If the momentum of a body remains constant, then the mass-speed graph of the body is a :

(1) circle (2) straight line

(3) rectangular hyperbola (4) parabola

28. A body of mass M moving with a speed u has a head-on collision with a body of mass m at rest. If M >> m, the speed of the body with mass m after the collision will be nearly :

(1) um/M (2) uM/m (3) u/2 (4) 2u

29. If a body moves through a distance greater than $2\pi R$ in one full rotation, then :

(1) $v_{cm} > R\omega$ (2) $v_{cm} < R\omega$ (3) $v_{cm} \geq R\omega$ (4) $v_{cm} \leq R\omega$

30. The work done by an external agent to shift a point mass from infinity to the centre of earth is :

(1) zero (2) greater than zero

(3) less than zero (4) ≤ 0

31. The dimensions of solar constant which relates to the energy received by the earth are :

(1) $[ML^2 T^{-3}]$ (2) $[M^2 L^0 T^{-1}]$ (3) $[ML^0 T^{-3}]$ (4) $[ML^1 T^{-2}]$

32. If the speed of light is 3×10^{10} cm sec^{-1}, the distance travelled by the light in one light year in meters is :

(1) 3×10^{12}

(2) 9.461×10^{15}

(3) 3×10^{15}

(4) 3.126×10^{14}

33. If a car travels 4 km towards north at an angle of 45° to the east and then travels a distance of 2 km towards north at an angle of 135° to the east, the total distance travelled by the car in km is :

(1) 6 (2) 8 (3) 5.64 (4) 4.95

34. If $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$ and θ increases at a uniform rate ω, then the velocity of the particle is :

(1) $a\omega$ (2) $a^2\theta/\omega$ (3) $a\theta/\omega$ (4) $a\theta\omega$

35. If the velocity of a moving particle, $v = x^n$ where x is the displacement, then :

(1) when $x = 0$, the velocity and acceleration are zero

(2) for the body in motion, $n > 1/2$

(3) for the body in motion, $n < 1/2$

(4) both (1) and (2)

PART – B

CHEMISTRY

36. The set with correct order of acidity is :

(1) $HClO < HClO_2 < HClO_3 < HClO_4$

(2) $HClO_4 < HClO_3 < HClO_2 < HClO$

(3) $HClO < HClO_4 < HClO_3 < HClO_2$

(4) $HClO_4 < HClO_2 < HClO_3 < HClO$

37. The gas obtained when bleaching powder is treated with warm concentrated solution of NH_3 is :

(1) Cl_2 (2) N_2 (3) NO (4) H_2

38. When SO_2 is passed through acidified $K_2Cr_2O_7$ solution :

(1) The solution turns blue

(2) The solution is decolorized

(3) The solution turns green

(4) SO_2 is reduced

39. The complex used as an anticancer agent is :

(1) mer – $[Co(NH_3)_3Cl_3]$

(2) Cis – $[PtCl_2(NH_3)_2]$

(3) Cis – $K_2[PtCl_2Br_2]$

(4) Na_2CoCl_4

40. Which is ***not*** an organometallic compound ?

(1) C_3H_7MgI

(2) C_2H_5ONa

(3) $(C_2H_5)_3Al$

(4) TEL

41. Which of the following substance acts as superconductor at 4 K ?

(1) *Hg*

(2) *Cu*

(3) *Na*

(4) *Mg*

42. In fireflies the flashes are produced due to combustion of a protein luciferin in air and moisture. The phenomenon is known as :

(1) Photochemical change

(2) Photo combustion

(3) Chemiluminescence

(4) None of these

43. For the Coagulation of 100 mL of arsenious sol, 5 mL of 1 M *NaCl* is required. The flocculation value of *NaCl* is :

(1) 5 (2) 50 (3) 25 (4) 1

44. A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14}\ s^{-1}$. The half-life of the reaction is :

(1) 1.26×10^{13} s

(2) 1.26×10^{-13} s

(3) 5.5×10^{13} s

(4) 5.5×10^{-13} s

45. Which of the following is ***not*** a metal refining process ?

(1) Baeyer's process
(2) Mond process
(3) Van Arkel process
(4) Liquation process

46. Entropy of vaporization of water at 100°C, if molar heat of vaporization is 9710 Cal mol^{-1} will be :

(1) 20 Cal mol^{-1} K^{-1}
(2) 26 Cal mol^{-1} K^{-1}
(3) 24 Cal mol^{-1} K^{-1}
(4) 28 Cal mol^{-1} K^{-1}

47. 1 mole of N_2 and 2 moles of H_2 are allowed to react in a 1 dm^3 vessel. At equilibrium 0.8 mole of NH_3 is formed. The concentration of H_2 in the vessel is :

(1) 0.6 M
(2) 0.8 M
(3) 0.2 M
(4) 0.4 M

48. Which is most powerful reducing agent ?

(1) Molecular hydrogen
(2) Atomic hydrogen
(3) Nascent hydrogen
(4) All have same reducing power

49. Lithium is the strongest reducing agent among alkali metals due to which of the following factor ?

(1) Ionization energy
(2) Electron affinity
(3) Hydration energy
(4) Lattice energy

50. Potassium is stored under :

(1) Water
(2) Ethyl alcohol
(3) Liquid ammonia
(4) Kerosene

51. The vitamin which is neither soluble in water nor in fat is :

(1) Phylloquinone
(2) Biotin
(3) Thiamine
(4) Ergocalciferol

52. Violet colour is obtain when dilute $CuSO_4$ is added in an alkaline solution of protein. The test is known as :

(1) Biuret test (2) Xanthoproteic test

(3) Million's test (4) Ninhydrin test

53. The hormone that helps in conversion of glucose in glycogen is :

(1) Cortisone (2) Calcitonin

(3) Adrenaline (4) Insulin

54. Which of the following is used as "a morning after pill" ?

(1) Norethindrone (2) Ethynylestradiol

(3) Mifepristone (4) Bithional

55. Barbituric acid and its derivatives are well known as :

(1) Tranquilizers (2) Antiseptics

(3) Analgesics (4) Antipyretics

56. Phenol $\xrightarrow{1.\,NaOH\ \ 2.\,CO_2/140°C} A \xrightarrow{H^+/H_2O} B \xrightarrow{Ac_2O} C$

In this reaction, the end product is :

(1) Salicylaldehyde (2) Salicylic acid

(3) Phenyl acetate (4) Aspirin

57. Malonic acid on heating gives :

(1) Formic acid (2) Acetic acid (3) Oxalic acid (4) Acetaldehyde

58. An organic compound (A) on reduction gives compound (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N-methylaniline. The compound (A) is :

(1) Methylamine (2) Nitromethane (3) Aniline (4) Nitrobenzene

59. Keratin, a structural protein is present in :

(1) Hair (2) Skin (3) Wool (4) All of these

60. In DNA, the complimentary bases are :

(1) Adenine and thymine; guanine and uracil

(2) Adenine and thymine; guanine and cytosine

(3) Adenine and guanine; thymine and uracil

(4) Adenine and uracil; guanine and cytosine

61. Pyrosilicate ion is :

(1) SiO_2^{2-} (2) SiO_4^{2-}

(3) $Si_2O_6^{7-}$ (4) $Si_2O_7^{6-}$

62. Ethylene reacts with sulphur monochloride to give :

(1) Phosgene (2) Mustard gas

(3) Ethylene chloride (4) None of these

63. Which one of the following regions of atmosphere contains Ozone ?

(1) Troposphere (2) Thermosphere

(3) Mesosphere (4) Stratosphere

64. Azeotropic mixtures are :

(1) Constant boiling mixture (2) Those which boil at different temp.

(3) Mixture of two solids (4) None of these

65. An example of Frenkel as well as Schottky defect is :

(1) *NaBr* (2) *TlBr*

(3) *AgBr* (4) *CuBr*

66. How many molecules are present in one gram of hydrogen ?

(1) 6.02×10^{23} (2) 3.01×10^{23} (3) 2.5×10^{23} (4) 1.5×10^{23}

67. The de-Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is :

(1) 6.63×10^{-33} m (2) 6.63×10^{-34} m

(3) 6.63×10^{-35} m (4) 6.63×10^{-36} m

68. Which of the following is correct order of size ?

(1) $I > I^- > I^+$ (2) $I > I^+ > I^-$

(3) $I^+ > I^- > I$ (4) $I^- > I > I^+$

69. IF_5 has the following hybridization :

(1) sp^3d^2 (2) sp^3d^3

(3) sp^3d (4) none of these

70. Absolute zero is the temperature at which :

(1) Rotational motion ceases (2) Volume become zero

(3) Mass become zero (4) None of these

OPTIONAL

PART – C (i)

MATHEMATICS

71. If $f : R \to R$ is a mapping defined by $f(x) = x^3 + 3$, then $f^{-1}(x)$ is equal to :

(1) $(x+3)^{1/3}$ (2) $(x-3)^{1/3}$

(3) $(3-x)^{1/3}$ (4) $(x^3+3)^{-1}$

72. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1}x\right) = 1$, then $x =$

(1) 0 (2) $\frac{4}{5}$ (3) $\frac{3}{5}$ (4) $\frac{1}{5}$

73. If A and B are symmetric matrices of the same order then AB – BA is :

(1) Unit matrix

(2) Symmetric matrix

(3) Skew-symmetric matrix

(4) Null matrix

74. The value of the determinant

$$\begin{vmatrix} \cos\alpha & -\sin\alpha & 1 \\ \sin\alpha & \cos\alpha & 1 \\ \cos(\alpha+\beta) & -\sin(\alpha+\beta) & 1 \end{vmatrix} \text{ is :}$$

(1) Independent of β

(2) Independent of α

(3) Independent of α and β

(4) Zero

75. If $y = x + e^x$, then $\frac{d^2x}{dy^2} =$

(1) $\frac{-e^x}{(1+e^x)^3}$

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

(3) $\frac{1}{(1+e^x)^2}$

(4) $\frac{e^x}{1+e^x}$

76. If the x-coordinate of a point P on the join of A(2, 2, 1) and B(5, 1, –2) is 4, then its y–coordinate is :

(1) 2 (2) $\frac{3}{2}$ (3) $\frac{4}{3}$ (4) -2

77. The value of $\lim_{x\to 0} \frac{\sqrt{1-\cos x^2}}{1-\cos x}$ is :

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

78. If $x^y = e^{x-y}$, then $\frac{dy}{dx} =$

(1) $\frac{1}{(1+\log x)^2}$ (2) $\frac{\log x}{(1+\log x)^2}$ (3) $\frac{1}{1+\log x}$ (4) $\frac{\log x}{1+\log x}$

79. Mean square deviation of a distribution is least when deviations are taken about :

(1) mode (2) mean (3) median (4) zero

80. Two players play a game where each of them is asked to select a number from 1 to 25. If the two numbers match, both of them win a prize. The probability that they will not win a prize in a single trial is :

(1) $\frac{1}{5}$ (2) $\frac{19}{25}$ (3) $\frac{1}{25}$ (4) $\frac{24}{25}$

81. The area of the region lying between the line $x - y + 2 = 0$ and the curve $x = \sqrt{y}$ is :

(1) 4/3 (2) 5/4 (3) 9/2 (4) 10/3

82. If $f(x) = f'(x)$ and $f(1) = 2$, then $f(3) =$

(1) $2e^2$ (2) $3e^2$ (3) $2e^3$ (4) $\frac{e^2}{3}$

83. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{c} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent vectors and $|\vec{c}| = \sqrt{3}$, then :

(1) $\alpha = 1, \beta = \pm 1$ (2) $\alpha = \pm 1, \beta = 1$

(3) $\alpha = -1, \beta = \pm 1$ (4) $\alpha = \pm 1, \beta = -1$

84. The line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the curve $xy = c^2, z = 0$ then $c =$

(1) $\pm\sqrt{5}$ (2) $\pm\sqrt{3}$

(3) $\pm\frac{1}{3}$ (4) $\pm\frac{\sqrt{5}}{2}$

85. A coin is tossed three times, the probability of getting head and tail alternately is :

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

86. If ${}^nP_r = 120\ {}^nC_r$, then the value of r is :

(1) 4 (2) 5 (3) 6 (4) 7

87. The number of terms in the expansion of $(1+\sqrt{2}x)^9 + (1-\sqrt{2}x)^9$ is :

(1) 10 (2) 9 (3) 8 (4) 5

88. If $a = 1 + x + x^2 + \ldots\ldots\ldots \infty$ and $b = 1 + y + y^2 + \ldots\ldots\ldots \infty$ where x and y are proper fractions, then $1 + xy + x^2y^2 + \ldots\ldots\ldots \infty$ is equal to :

(1) $\frac{ab}{a+b-1}$ (2) $\frac{ab}{a+b}$ (3) $\frac{ab}{a-b}$ (4) $\frac{a+b}{a-b}$

89. A straight line passes through (2, 2) and is perpendicular to the line $3x + y = 3$. Its y-intercept is :

(1) $\frac{2}{3}$ (2) $\frac{3}{2}$ (3) $\frac{3}{4}$ (4) $\frac{4}{3}$

90. The line $x + y = 2$ is a normal to the parabola $y^2 = 8x$ at the point :

(1) (2, 4) (2) (−2, 4) (3) (4, 2) (4) (3, 2)

91. If A and B are two non-empty sets, then $A \cap (B \cup A)' =$

(1) ϕ (2) A

(3) B (4) Not defined

92. If $f(x) = 3^x$, then f(0), f(1), f(2) ..... are in :

(1) AP (2) GP

(3) HP (4) AG series

93. The value of $\frac{1-\tan^2 15°}{1+\tan^2 15°}$ is :

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

94. Which of the following statements is incorrect ?

(1) $\cos\theta = \frac{2}{5}$ (2) $\sin\theta = -\frac{1}{3}$

(3) $\sec\theta = \frac{1}{2}$ (4) $\tan\theta = 6$

95. For any complex number z, the minimum value of $|z| + |z-1|$ is :

(1) 0 (2) $\frac{1}{2}$ (3) 1 (4) $\frac{2}{3}$

96. If the tangent to the curve $x = a(\theta + \sin\theta)$, $y = a(1 + \cos\theta)$ at $\theta = \pi/3$ makes an angle α with the x-axis, then α =

(1) $\pi/6$ (2) $\pi/2$

(3) $5\pi/6$ (4) $2\pi/3$

97. The value of K for which the function $f(x) = K\sin x + \frac{1}{3}\sin 3x$ has an extremum at $x = \pi/3$ is :

(1) 0 (2) 1 (3) 2/3 (4) 2

98. The function $f(x) = x + \cot^{-1} x$ increases in the interval :

(1) $(-\infty, \infty)$ (2) $(-1, \infty)$ (3) $(1, \infty)$ (4) $[0, \infty)$

99. $\int \frac{x + \sin x}{1 + \cos x}\,dx =$

(1) $\tan\frac{x}{2} + c$ (2) $x\tan\frac{x}{2} + c$

(3) $\cot\frac{x}{2} + c$ (4) $x\cot\frac{x}{2} + c$

100. $\int_0^{\log 5} \frac{e^x\sqrt{e^x - 1}}{e^x + 3}\,dx =$

(1) $2 + \pi$ (2) $3 - \pi$ (3) $4 - \pi$ (4) $3 + 2\pi$

OPTIONAL

PART – C (ii)

BIOLOGY

101. The F_2 generation offsprings in a plant showing incomplete dominance, exhibit :

(1) Variable genotypic and phenotypic ratios

(2) A phenotypic ratio of 3 : 1

(3) A genotypic ratio of 1 : 1

(4) Similar genotypic and phenotypic ratio of 1 : 2 : 1

102. Diabetes insipidus is caused by deficient secretion of :

(1) Insulin

(2) Glucagon

(3) Vassopresin

(4) Oxytocin

103. DOTS strategy is used to treat :

(1) HIV

(2) Malaria

(3) Tuberculosis

(4) Hepatitis

104. Which of the following microbe is used as biopesticide ?

(1) *Agrobacterium tumefaciens*

(2) *Bacillus thuringiensis*

(3) *Agrobacterium rhizogenes*

(4) *Bacillus amyloliquefaciens*

105. Organisms called methanogens are most abundant in a :

(1) Hot spring

(2) Sulphur rock

(3) Cattle yard

(4) Polluted stream

106. Fixation of one molecule of CO_2 by Calvin-Benson cycle requires :

(1) 3 ATP and 2 NADPH + H^+

(2) 5 ATP and 2 NADPH + H^+

(3) 12 ATP and 12 NADPH + H^+

(4) 18 ATP and 12 NADPH + H^+

107. Photoperiodic stimulus for flowering is perceived by :

(1) Shoot tips (2) Leaves (3) Flowers (4) Roots

108. Embryo sac is equivalent to :

(1) Megaspore (2) Integumented megasporangium

(3) Female gametophyte (4) Fruit

109. The condition where flowers do not open is known as :

(1) Chasmogamous (2) Cleistogamous

(3) Geitonogamy (4) Autogamy

110. The coding sequences in eukaryotic DNA are known as :

(1) Recon (2) Exon (3) Intron (4) Mucon

111. Bile is released by the action of :

(1) Gastrin (2) Secretin

(3) Cholecystokinin (4) Insulin

112. Uricotelic excretion is mainly an adaptation for :

(1) Conservation of urea producing enzyme

(2) Raising osmotic concentration of blood

(3) Conservation of water

(4) Storage of waste materials

113. DNA sequence is ATG. What would be the sequence of bases in anticodon of tRNA ?

(1) ATG (2) UAC

(3) TAC (4) AUG

114. Who proposed the 'theory of mutation' ?

(1) J. B. de Lamarck (2) A. Weisman

(3) Hugo de Vries (4) A. I. Oparin

115. Red data book provides data on :

(1) Biota of red sea

(2) Effect of red light on photosynthesis

(3) Red pigmented plants

(4) Threatened species

116. A disaccharide made up of two glucose units is :

(1) Sucrose (2) Maltose (3) Lactose (4) Dextrin

117. A cell organelle which is bounded by a single membrane and contains enzymes involved in conversion of fat to carbohydrate is :

(1) Spherosomes (2) Lysosomes

(3) Glyoxysomes (4) Peroxisomes

118. Iron is ***not*** a component of :

(1) Cytochromes (2) Peroxidases

(3) Catalases (4) Carbonic anhydrases

119. An organism is respiring in a bell jar filled with $^{18}O_2$. Which product of the respiration will contain labelled O_2 ?

(1) CO_2 (2) H_2O

(3) Both of them (4) None of them

120. During photorespiration, the conversion of phosphoglycolate to glycolate takes place in which cell organelle ?

(1) Peroxisome
(2) Glyoxysome
(3) Mitochondria
(4) Chloroplast

121. Viroids are :

(1) ssRNA not enclosed by protein coat
(2) ssRNA enclosed by protein coat
(3) dsRNA enclosed by protein coat
(4) dsDNA enclosed by protein coat

122. The seedless vascular plants are :

(1) Bryophytes
(2) Pteridophytes
(3) Gymnosperms
(4) Angiosperms

123. The spindle fibers involved in the separation and migration of chromosomes during telophase are made of :

(1) Microbodies
(2) Microsomes
(3) Microtubules
(4) Endoplasmic reticulum

124. A monocarpic plant :

(1) Has one carpel
(2) Produces only one seed
(3) Produces one fruit only
(4) Flowers only once in lifetime

125. Zymogen is :

(1) Enzyme poison
(2) Enzyme modulator
(3) Enzyme precursor
(4) Enzyme inhibitor

126. In coming years, the skin diseases will be more common due to :

(1) Increase in air pollution

(2) Increase in CO_2

(3) Excess use of detergents

(4) Depletion of Ozone

127. Which biogeochemical cycle is ***not*** gaseous ?

(1) Carbon cycle

(2) Nitrogen cycle

(3) Phosphorous cycle

(4) Sulfur cycle

128. If the number of chromosomes in the endosperm cells of a plant are 21 chromosomes, what will be the number of chromosomes in the gametes ?

(1) 21 (2) 14 (3) 7 (4) 44

129. Ovulation occurs under the influence of :

(1) LH

(2) FSH

(3) Estrogen

(4) Progesteron

130. Organ of corti occurs in :

(1) External ear

(2) Middle ear

(3) Cochlea

(4) Retina

SET : A

1. 3	20. 3	39. 1	58. 3	77. 4	96. 4	115. 2
2. 2	21. 3	40. 1	59. 2	78. 1	97. 1	116. 4
3. 1	22. 1	41. 2	60. 2	79. 4	98. 2	117. 3
4. 4	23. 1	42. 2	61. 4	80. 1	99. 1	118. 3
5. 4	24. 2	43. 2	62. 2	81. 3	100. 3	119. 2
6. 3	25. 1	44. 3	63. 4	82. 1	101. 1	120. 3
7. 1	26. 2	45. 4	64. 4	83. 2	102. 2	121. 4
8. 3	27. 1	46. 4	65. 2	84. 2	103. 3	122. 3
9. 3	28. 1	47. 2	66. 2	85. 4	104. 4	123. 3
10. 4	29. 1	48. 4	67. 1	86. 2	105. 3	124. 1
11. 3	30. 1	49. 1	68. 4	87. 4	106. 2	125. 3
12. 3	31. 1	50. 3	69. 3	88. 3	107. 3	126. 3
13. 4	32. 1	51. 1	70. 1	89. 2	108. 4	127. 3
14. 1	33. 3	52. 3	71. 1	90. 1	109. 2	128. 4
15. 3	34. 3	53. 2	72. 2	91. 3	110. 4	129. 3
16. 2	35. 3	54. 1	73. 4	92. 4	111. 1	130. 4
17. 1	36. 2	55. 1	74. 3	93. 1	112. 2	
18. 2	37. 1	56. 1	75. 3	94. 2	113. 3	
19. 1	38. 4	57. 2	76. 2	95. 3	114. 2	

1. 1	20. 3	39. 3	58. 2	77. 4	96. 2	115. 3
2. 1	21. 3	40. 1	59. 3	78. 1	97. 4	116. 1
3. 3	22. 1	41. 4	60. 4	79. 2	98. 3	117. 2
4. 3	23. 3	42. 2	61. 2	80. 3	99. 2	118. 3
5. 3	24. 3	43. 4	62. 1	81. 1	100. 1	119. 2
6. 2	25. 4	44. 4	63. 4	82. 2	101. 3	120. 2
7. 1	26. 3	45. 2	64. 1	83. 4	102. 3	121. 2
8. 1	27. 2	46. 1	65. 1	84. 3	103. 4	122. 3
9. 1	28. 1	47. 2	66. 1	85. 3	104. 3	123. 4
10. 1	29. 4	48. 3	67. 3	86. 3	105. 4	124. 2
11. 3	30. 4	49. 2	68. 2	87. 1	106. 4	125. 4
12. 1	31. 2	50. 2	69. 1	88. 2	107. 3	126. 4
13. 1	32. 1	51. 4	70. 1	89. 2	108. 3	127. 3
14. 2	33. 2	52. 2	71. 4	90. 4	109. 1	128. 3
15. 1	34. 1	53. 4	72. 1	91. 2	110. 3	129. 2
16. 3	35. 3	54. 1	73. 2	92. 4	111. 1	130. 3
17. 3	36. 2	55. 3	74. 1	93. 1	112. 2	
18. 4	37. 1	56. 2	75. 3	94. 4	113. 3	
19. 1	38. 4	57. 2	76. 3	95. 1	114. 4	

1. 2	20. 4	39. 4	58. 4	77. 4	96. 3	115. 4
2. 1	21. 3	40. 2	59. 1	78. 3	97. 1	116. 1
3. 1	22. 2	41. 1	60. 1	79. 2	98. 2	117. 2
4. 1	23. 1	42. 2	61. 2	80. 1	99. 2	118. 3
5. 1	24. 4	43. 3	62. 1	81. 2	100. 4	119. 4
6. 3	25. 4	44. 2	63. 4	82. 4	101. 4	120. 3
7. 1	26. 1	45. 2	64. 3	83. 1	102. 3	121. 3
8. 1	27. 1	46. 1	65. 1	84. 4	103. 3	122. 3
9. 2	28. 3	47. 3	66. 4	85. 1	104. 1	123. 4
10. 1	29. 3	48. 2	67. 2	86. 1	105. 3	124. 3
11. 2	30. 3	49. 1	68. 4	87. 2	106. 4	125. 4
12. 1	31. 3	50. 1	69. 1	88. 4	107. 3	126. 1
13. 2	32. 3	51. 2	70. 3	89. 3	108. 3	127. 2
14. 1	33. 4	52. 2	71. 3	90. 3	109. 2	128. 3
15. 3	34. 1	53. 2	72. 4	91. 4	110. 3	129. 2
16. 3	35. 3	54. 3	73. 1	92. 1	111. 2	130. 2
17. 1	36. 4	55. 4	74. 2	93. 2	112. 3	
18. 3	37. 2	56. 2	75. 3	94. 1	113. 4	
19. 3	38. 4	57. 1	76. 2	95. 3	114. 2	

SET : D

1. 3	20. 3	39. 2	58. 4	77. 1	96. 3	115. 4
2. 1	21. 2	40. 2	59. 4	78. 2	97. 4	116. 2
3. 1	22. 1	41. 1	60. 2	79. 2	98. 1	117. 3
4. 2	23. 1	42. 3	61. 4	80. 4	99. 2	118. 4
5. 1	24. 1	43. 2	62. 2	81. 4	100. 3	119. 2
6. 2	25. 1	44. 1	63. 4	82. 1	101. 4	120. 4
7. 1	26. 3	45. 1	64. 1	83. 2	102. 3	121. 1
8. 2	27. 3	46. 2	65. 3	84. 1	103. 3	122. 2
9. 1	28. 4	47. 2	66. 2	85. 3	104. 2	123. 3
10. 3	29. 1	48. 2	67. 1	86. 2	105. 3	124. 4
11. 3	30. 3	49. 3	68. 4	87. 4	106. 1	125. 3
12. 1	31. 3	50. 4	69. 1	88. 1	107. 2	126. 4
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15. 4	34. 4	53. 4	72. 4	91. 1	110. 2	129. 1
16. 1	35. 4	54. 3	73. 3	92. 2	111. 3	130. 3
17. 1	36. 1	55. 1	74. 2	93. 4	112. 3	
18. 3	37. 2	56. 4	75. 1	94. 3	113. 4	
19. 3	38. 3	57. 2	76. 3	95. 3	114. 3	