Total No. of Printed Pages : 21

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

BPH-EE-2018(SET-Y)

A

10005

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)

SEAL

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 σ is the Stefan's constant and b is the Wien's constant, then the dimensions of σb^4 are :

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

   (3) $[M^1L^6T^{-3}]$ (4) $[M^1L^4T^{-3}]$

2. A boy is hanging from a horizontal branch of a tree. The tension in the arms will be maximum when the angle between the arms is :

   (1) 0° (2) 60° (3) 90° (4) 120°

3. A body is projected such that it's K.E at the top is $\frac{3}{4}$th of it's initial K. E. What is the angle of projection with horizontal ?

   (1) 30° (2) 60° (3) 45° (4) 120°

4. A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of the 12 kg mass is 4 m/s. The kinetic energy of the other mass is :

   (1) 288 J (2) 192 J (3) 96 J (4) 144 J

5. The potential energy of a long spring when stretched by 2 cm is u. If the spring is stretched by 8 cm, the potential energy stored in it is :

   (1) $\frac{u}{4}$ (2) $4u$ (3) $16u$ (4) $8u$

6. A body is projected vertically up. At certain height h above the ground, it's P. E and K. E are in the ratio 1 : 4. At what height above the ground, P. E and K. E will be in the ratio 4 : 1 ?

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

7. Two bodies have their moments of inertia I and 2I respectively about the axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio :

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

8. The mass of a planet is six times that of the earth. The radius of the planet is twice that of the earth. If the escape velocity from the earth is v, then the escape velocity from the planet is :

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

9. If the earth shrinks such that it's mass does not change but radius decreases to one quarter of it's original value then one complete day will be of :

(1) 96 hrs (2) 48 hrs (3) 6 hrs (4) 1.5 hrs

10. A liquid will not wet the surface of a solid if its angle of contact is :

(1) zero (2) Less than 90^{o}
(3) more than 90^{o} (4) 90^{o}

11. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. Then the ratio of their volume is :

(1) 3 : 2 (2) 4 : 9 (3) 9 : 4 (4) 27 : 8

12. A gas undergoes an adiabatic change it's specific heat in the process is :

(1) zero (2) 1 (3) ∞ (4) 0.5

13. At which of the following temperatures would the molecules of a gas have twice the average kinetic energy they have at $27^{o}C$?

(1) $327^{o}C$ (2) $377^{o}C$ (3) $397^{o}C$ (4) $587^{o}C$

14. A refrigerator absorbs 2000 cals of heat from ice trays. If coefficient of performance is 4, then work done by the motor is :

(1) 2100 J (2) 4200 J (3) 8400 J (4) 500 J

SEAL

15. When the displacement is half of the amplitude, then what fraction of the total energy of a simple harmonic oscillator is kinetic ?

(1) $\frac{2}{7}$th (2) $\frac{3}{4}$th (3) $\frac{2}{9}$th (4) $\frac{5}{7}$th

16. A tuning fork produces 8 beats/sec with both, 80 and 70 cm of stretched wire of sonometer. Frequency of the fork is :

(1) 120 Hz (2) 128 Hz (3) 112 Hz (4) 240 Hz

17. A pipe closed at one end produces a fundamental note at 412 Hz. It is cut into two pieces of equal length. The fundamental frequencies produced in the two pieces are :

(1) 206 Hz, 412 Hz (2) 824 Hz, 1648 Hz

(3) 412 Hz, 824 Hz (4) 206 Hz, 824 Hz

18. An α-particle and a proton are accelerated through same potential difference from rest. The ratio of their final velocities is :

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

19. The resistance of a wire of uniform length L and diameter D is R. The resistance of another wire of same material but length $4L$ and diameter $2D$ will be :

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

20. A 10 μF capacitor is charged by a battery of emf 100 V. The energy drawn from the battery and the energy stored in the capacitor, are respectively :

(1) 0.10 J and 0.05 J (2) 0.05 J and 0.10 J

(3) 1.0 mJ and 0.5 mJ (4) 0.05 J and 0.05 J

21. Two cells, each of emf E and internal resistance r are connected in parallel across a resistor R. The power delivered to the resistor is maximum if :

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

22. A steel wire of length l has a magnetic moment M, it is bent into L shape from middle. The new magnetic moment is :

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

23. A proton, a deuteron and an α-particle enter a magnetic field perpendicular to it with same velocities. What is the ratio of radii of circular path ?

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

24. If the self-inductance of 500 turn coil is 125 mH, then the self-inductance of similar coil of 800 turns is :

(1) 48.8 mH (2) 200 mH (3) 187.5 mH (4) 320 mH

25. In an LCR circuit having L = 8 henry, C = 0.5 μF and R = 100 ohm in series, the resonance frequency in Hz is :

(1) 600 (2) 600π (3) $\frac{250}{\pi}$ (4) 5000

26. The frequency of ultraviolet light is of the order of :

(1) 10^7 Hz (2) 10^{10} Hz (3) 10^{12} Hz (4) 10^{15} Hz

27. In Young's double slit experiment, nth bright fringe of red light ($\lambda_1 = 7500\ \mathring{A}$) coincides with (n + 1)th bright fringe of green light ($\lambda_2 = 6000\ \mathring{A}$). The value of n is :

(1) 4 (2) 5 (3) 3 (4) 2

28. An endoscope is employed to view the internal parts of the body. It is based on the principle of :

(1) Reflection (2) Refraction

(3) Total internal reflection (4) Dispersion

29. Focal lengths of objective and eye-piece of a telescope are 200 cm and 4 cm respectively. The length of the telescope in normal adjustment is :

(1) 196 cm (2) 204 cm (3) 250 cm (4) 225 cm

30. Which of the following series of hydrogen spectrum is in the visible region ?

(1) Lymann series (2) Balmer series

(3) Paschen series (4) Bracket series

31. The rest mass of a photon is :

(1) $\frac{h\nu}{c}$ (2) $\frac{h\nu}{c^2}$ (3) $\frac{hc}{\lambda}$ (4) zero

32. For nuclear fission to take place the neutrons must have :

(1) Very very low energy (2) Thermal energy

(3) Very high energy (4) No kinetic energy

33. The half value period of a radioactive nuclide is 3 hours. In 9 hours, it's activity will be reduced to :

(1) $\frac{1}{9}$ (2) $\frac{1}{27}$ (3) $\frac{1}{6}$ (4) $\frac{1}{8}$

34. Digital circuits can be made by repetitive use of :

(1) OR gate (2) AND gate (3) NOT gate (4) NAND gate

35. In a common base transistor amplifier the current gain is :

(1) One (2) More than one

(3) Less than one (4) Infinite

PART – B

(CHEMISTRY)

36. Atomic wt. of barium is 137.34. The equivalent weight of barium in $BaCrO_4$ used as oxidizing agent in acid medium is :

(1) 137.34 (2) 45.78 (3) 114.45 (4) 68.67

37. The density of 1 M solution of NaCl is 1.0585 g/ml. The molality of the solution is :

(1) 1.0585 (2) 1.00 (3) 0.10 (4) 0.0585

38. The strength of an Oxo acid (E-O-H) where E is the central atom, depends upon the :

(1) Electronegativity of E
(2) Atomic size of E
(3) Ability of E to share electron pair with O
(4) Atomic size and electronegativity of E.

39. $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$ I_2 obtained from 0.1 mole of $CuSO_4$ sample required 100 ml of 1 M hypo, hence mole percentage of pure $CuSO_4$ is :

(1) 100 (2) 50 (3) 25 (4) None is correct

40. The hybridization of carbon atoms in C – C single bond of $HC \equiv C - CH = CH_2$ is :

(1) $sp^3 - sp^3$ (2) $sp - sp^2$ (3) $sp^2 - sp^2$ (4) $sp^3 - sp$

41. Which of the following is not true for resonance ?

(1) Identical arrangement of atoms (2) Identical bonding
(3) Same no. of paired electron (4) Structure with same energies

42. The geometry of $Ni(CO)_4$ and $Ni(PPh_3)_2\ Cl_2$ are :

(1) Both square planar (2) Tetrahedral and square planar
(3) Both tetrahedral (4) Square planar and tetrahedral

43. The paramagnetism of O_2 molecule is believed to be due to the presence of two electrons with parallel spins in :

(1) Bonding π orbitals (2) Antibonding π orbitals
(3) Bonding σ orbitals (4) Antibonding σ orbitals

44. Trisoxalato aluminate (III) ion is :

(1) $[Al(C_2O_4)_3]$ (2) $[Al(C_2O_4)_3]^{3+}$
(3) $[Al(C_2O_4)_3]^{2-}$ (4) $Al[(C_2O_4)_3]^{3-}$

45. $[CrF_6]^{3-}$ has Cr atom ..... hybridized.

(1) sp^2d^2 (2) d^2sp^3 (3) $d\,sp^2$ (4) sp^3d

46. For an α-emitting isotope, the value of disintegration constant is 0.49×10^{-10} per year. The amount of the isotope of a given sample will reduce to half its value after a period (in years) of nearly :

(1) 0.45×10^{10} (2) 0.9×10^{10} (3) 1.41×10^{10} (4) 2.82×10^{10}

47. Number of photons of light of wavelength 4000 $\mathring{A}$ required to provide 1.00 J of energy is :

(1) 2.01×10^{18} (2) 12.01×10^{31} (3) 1.35×10^{17} (4) None is correct

48. Vander Waal's equation for one mole of CO_2 gas at low pressure will be :

(1) $\left(P+\frac{a}{V^2}\right)V=RT$ (2) $P(V-b)=RT-\frac{a}{V^2}$

(3) $P=\frac{RT}{V-b}$ (4) $P=\left(\frac{RT}{V-b}-\frac{a}{V^2}\right)$

49. A gas in an open container is heated from $27^\circ C$ to $127^\circ C$, the fraction of the original amount of gas remaining in the container will be :

(1) 3/4 (2) 1/2 (3) 1/4 (4) 1/8

50. The temperature at which a real gas obeys the ideal gas laws over a fairly wide range of pressure is :

(1) Critical temperature (2) Inversion temperature

(3) Boyle's temperature (4) Reduced temperature

51. What is normality of 0.30 M H_3PO_4 (a tribasic acid) in the following reaction ?

$H_3PO_4+2OH^- \rightarrow HPO_4^{2-}+2H_2O$

(1) 0.30 N (2) 0.60 N (3) 0.90 N (4) 0.15 N

52. At $25^{\circ}C$, the vapour pressure of pure methyl alcohol is 92.0 torr. Mole fraction of CH_3OH in a solution in which vapour pressure of CH_3OH is 23.0 torr at $25^{\circ}C$ is :

(1) 0.25 (2) 0.75 (3) 0.50 (4) 0.66

53. Which has maximum osmotic pressure at temperature T ?

(1) 100 ml of 1 M urea solution

(2) 300 ml of 1 M glucose solution

(3) Mixture of 100 ml of 1 M urea solution and 300 ml of 1M glucose solution

(4) All are isotonic

54. Rate constant of a reaction is 0.0693 min^{-1}, starting with 10 mol, rate of reaction after 10 min is :

(1) 0.693 mol min^{-1} (2) 0.0693×2 mol min^{-1}

(3) 0.0693×5 mol min^{-1} (4) $0.0693 \times (5)^2$ mol min^{-1}

55. Equilibrium constant for the reaction :

$$NH_4OH + H^+ \rightleftharpoons NH_4^+ + H_2O$$

is 1.8×10^9. Hence equilibrium constant for $NH_3(aq) + H_2O \rightleftharpoons NH_4^+ + {}^-OH$ is :

(1) 1.8×10^{-5} (2) 1.8×10^5 (3) 1.8×10^{-9} (4) 5.55×10^{-10}

56. If ΔH of a reaction is 100 KJ mol^{-1}, then activation energy must be :

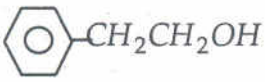
(1) Less than 100 KJ mol^{-1} (2) Greater than 100 KJ mol^{-1}

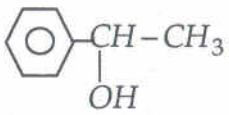
(3) Equal to 100 KJ mol^{-1} (4) None is correct

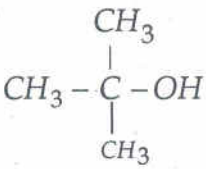
57. A gas expands against a constant external pressure of 2.00 atm, increasing its volume by 3.40 L. Simultaneously, the system absorbs 400 J of heat from its surroundings. What is ΔE, in joules for this gas ?

(1) –689 (2) + 289 (3) –289 (4) + 400

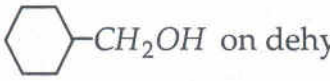
58. Which reacts faster with conc. HCl ?

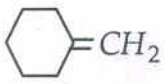
(1) 

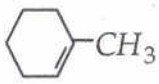
(2) 

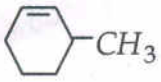
(3) 

(4) $CH_2 = CH - CH_2OH$

59.  on dehydration with conc. H_2SO_4 forms predominantly :

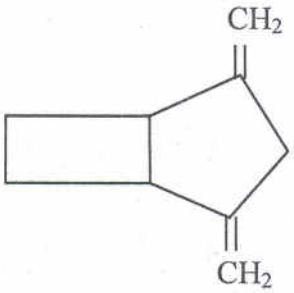
(1) 

(2) 

(3) 

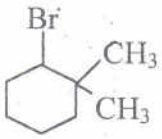
(4) None of these

60. Degree of unsaturation in



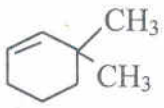
is :

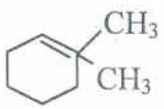
(1) 2 (2) 3 (3) 4 (4) 5

61. 

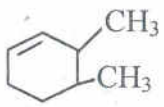
$\xrightarrow[KOH]{alcoholic}$ product

major product is :

(1) 

(2) 

(3) 

(4) 

62. Perchloroethane is :

(1) $CH_3CH_2ClO_4$

(2) C_2Cl_6

(3) CH_3-CCl_3

(4) $CCl_3.CHO$

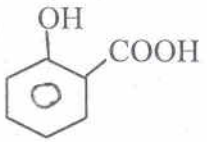
63. $\underset{A}{C_3H_6Cl_2} \xrightarrow[(iii)\ \Delta]{(i)\ KCN \\ (ii)\ H_3O^+} H_3C-\underset{CH_3}{\overset{}{\underset{|}{CH}}}-COOH$ A is :

(1) 1, 1 - dichloropropane

(2) 1, 2-dichloropropane

(3) 2, 2 dichloropropane

(4) 1, 3-dichloropropane

64. $Y \xleftarrow[Water]{Br_2}$ 

$\xrightarrow{HNO_3} X$

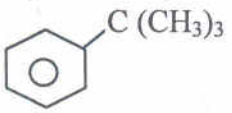
X and Y are :

(1) Picric acid, 2, 4, 6 - tribromophenol

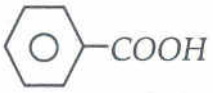
(2) 4-nitrosalicylic acid, 4-bromosalicylic acid

(3) o-nitrophenol, o-bromophenol

(4) None is correct

65. In  $\xrightarrow[\Delta]{KMnO_4}$ product

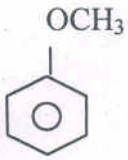
Product is :

(1) 

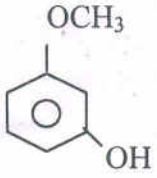
(2) $(CH_3)_3C-COOH$

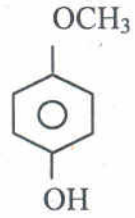
(3) Both are correct

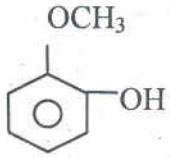
(4) None is correct

66. In  $\xrightarrow{aq\ KOH}$ product

Product is :

(1) 

(2) 

(3) 

(4)  + CH_3OK (mixture)

67. $HC \equiv CH + 2HCHO \xrightarrow{-OCH_3} X$

X is :

(1) $HOH_2C-C \equiv C-CH_2OH$

(2) $HOH_2C-C \equiv C-CH_2OCH_3$

(3) Both are correct

(4) None is correct

68. $H_2C = CH_2 \xrightarrow{h\nu}$ A

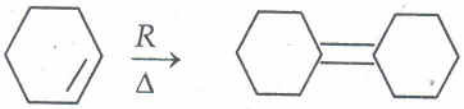
A is :

(1) $H_2C = CH - CH = CH_2$

(2) $H_3C - CH = CH - CH_2$

(3) 

(4) None is correct

69. 

A can be :

(1) Conc. H_2SO_4

(2) alcoholic KOH

(3) Et_3N

(4) t-BuOK

70. Identify the correct statement :

(1) Gypsum is obtained by heating Plaster of Paris

(2) Plaster of Paris can be obtained by hydration of gypsum

(3) Plaster of Paris contains higher percentage of calcium than does gypsum

(4) Plaster of Paris is obtained from gypsum by oxidation

OPTIONAL

PART – C (i)

(MATHEMATICS)

71. Domain of the function $y = \sqrt{4 - x^2}$ is :

(1) $R - [0, 2]$, where R is the set of real numbers

(2) $[-2, 2]$

(3) $[0, 2]$

(4) $(-\infty, -2) \cup (2, \infty)$

72. Let X be the universal set for sets A and B. If $n(A)=200, n(B)=300$ and $n(A\cap B)=100$, $n(A^c\cap B^c)=300$, then $n(X)$ is equal to :

(1) 500 (2) 600 (3) 700 (4) 400

73. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{2}{3}\right)\right]$ is :

(1) $\frac{17}{6}$ (2) $\frac{16}{7}$ (3) $\frac{6}{17}$ (4) None of these

74. If $\sec A+\tan A=\frac{3}{2}$, then :

(1) $\sin A=\frac{12}{13}$ (2) $\sin 2A=\frac{5}{13}$

(3) $\sin A=\frac{5}{13}$ (4) $\sin 2A=\frac{12}{13}$

75. If n is a positive integer, then $2.4^{2n+1}+3^{3n+1}$ is divisible by :

(1) 27 (2) 11 (3) 2 (4) 9

76. Which is not correct ?

(1) Each of the two complex roots of unity is the square of the other.

(2) Sum of the three cube roots of unity is zero.

(3) Product of the three cube roots of unity is one.

(4) None of these

77. If $(1+i)$ is a root of the equation $x^2+ax+2=0$. where $a\in R$, then the value of 'a' is :

(1) –2 (2) 2 (3) 1 (4) –1

78. Solution set of inequality $|3x-2|\le\frac{1}{2}$ is :

(1) $\left[-\frac{1}{2},\frac{1}{2}\right]$ (2) $\left[\frac{1}{2},\frac{5}{6}\right]$

(3) $\left[-\frac{1}{2},\frac{3}{2}\right]$ (4) $\left[\frac{3}{2},\frac{5}{2}\right]$

79. Sum of all the odd divisors of 720 is :

(1) 78 (2) 76 (3) 84 (4) 80

80. The binomial co-efficient of the 4th term in the expansion of $(x-q)^5$ is :

(1) 5 (2) 15 (3) 10 (4) 20

81. If $\frac{1}{b+c}, \frac{1}{c+a}$ and $\frac{1}{a+b}$ are in A. P., then a^2, b^2 and c^2 are in :

(1) Geometric Progression (2) Arithmetic Progression

(3) Harmonic Progression (4) None of these

82. The equation of the straight line passing through the point (2, 3) and making intercepts on axes equal in magnitude and sign is :

(1) $x+y=3$ (2) $x-y=5$ (3) $x+y=-5$ (4) $x+y=5$

83. The foci of an ellipse are $(\pm 4, 0)$ and vertices at $(\pm 5, 0)$. Then the equation of the ellipse is :

(1) $\frac{x^2}{25}+\frac{y^2}{9}=1$ (2) $\frac{x^2}{9}+\frac{y^2}{16}=1$

(3) $9x^2+25y^2=1$ (4) None of these

84. The point which divides the line joining the points (2, 4, 5) and (3,5,–4) in the ratio $-2:3$ lies on :

(1) ZOX plane (2) XOY plane

(3) YOZ plane (4) None of these

85. The value of $\lim_{x\to 0}\frac{x}{1-\sqrt{1-x}}$ is :

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

86. If $x = a\cos^3\theta, y = a\sin^3\theta$, then $\frac{dy}{dx}$ is equal to :

(1) cot t (2) cos t (3) tan t (4) – tan t

87. If X, M, Z are denoting Mean, median and mode of a data and $X : M = 9 : 8$, then the ratio M : Z is given by :

(1) 8 : 9 (2) 4 : 3 (3) 7 : 6 (4) 5 : 4

88. Two dice are rolled together, the probability that the total score on the two dice is greater than 10 is given by :

(1) $\frac{1}{4}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{5}{6}$

89. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then $A^2 + 2A$ is equal to :

(1) $3A$ (2) $4A$ (3) $2A$ (4) A

90. The value of the determinant

$$\begin{vmatrix} 1 & x & y+z \\ 1 & y & z+x \\ 1 & z & x+y \end{vmatrix}$$ is :

(1) $x+y+z$ (2) 0 (3) 1 (4) $(1+x+y+z)$

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

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

(3) $\frac{\log x}{(1-\log x)}$ (4) $\log x(\log ex)^{-1}$

92. If x be real, the minimum value of $x^2 - 8x + 17$ is :

(1) –1 (2) 0 (3) 1 (4) 2

93. The value of $\int \frac{2e^x}{e^{2x}+1}dx$ is equal to :

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

(3) $\log(1+e^{2x})+c$ (4) $\tan^{-1}(2e^x+1)+c$

94. The area bounded by the curve $y^2=4x$ and $x^2=4y$ is :

(1) $\frac{16}{3}$ sq. units (2) $\frac{3}{16}$ sq. units

(3) $\frac{14}{3}$ sq. units (4) $\frac{3}{14}$ sq. units

95. The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=x^2$ is :

(1) $x+y=\frac{x^2}{2}+c$ (2) $xy=\frac{1}{4}x^4+c$

(3) $x-y=\frac{1}{3}x^3+c$ (4) $y-x=\frac{1}{4}x^4+c$

96. A random variable X has the following probability distribution values of X :

X :	1	2	3	4	5
P(X) :	k	3k	2k	k	2k

Then the value of $P(X<3)$ is :

(1) $\frac{6}{9}$ (2) $\frac{1}{9}$ (3) $\frac{4}{9}$ (4) $\frac{7}{9}$

97. A unit vector perpendicular to each of the vectors $-6\hat{i}+8\hat{k}$ and $8\hat{i}+6\hat{k}$ forming a right handed system is :

(1) $\hat{j}$ (2) $-\hat{j}$

(3) $\frac{1}{10}(6\hat{i}+8\hat{k})$ (4) $\frac{1}{10}(-6\hat{i}+8\hat{k})$

98. Which of the following is ***not*** associated with any LPP ?

(1) Feasible Solution (2) Optimum Solution

(3) Basic Solution (4) None of these

99. The distance of the plane $2x - 3y + 6z + 14 = 0$ from the origin is :

(1) 14 (2) 2 (3) –2 (4) 11

100. The direction cosines of the line joining the points (4, 3, – 5) and (–2, 1, – 8) are :

(1) $< 2, 4, -13 >$ (2) $< 6, 2, 3 >$ (3) $< \frac{6}{7}, \frac{2}{7}, \frac{3}{7} >$ (4) None of these

OPTIONAL

PART – C (ii)

(BIOLOGY)

101. Which of the following is developed by parthenogenesis ?

(1) Drones (2) Queen honey bee

(3) Worker honey bee (4) Both (2) and (3)

102. Apomixis is a type of reproduction that results in the development of a/an :

(1) New organism without fusion of gametes.

(2) New organisms from fusion products of gametes

(3) Embryo from endosperm

(4) Embryo from nucleus

103. Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy ?

(1) Six weeks (2) Eight weeks (3) Twelve weeks (4) Eighteen weeks

104. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called :

(1) Aneuploidy (2) Polyploidy

(3) Klinfelter's & Turner's syndrome (4) Monosomy

105. The clouds of cosmic dust and gases from which the entire solar system is believed to be formed by condensation, is called :

(1) Ylem (2) Whey (3) Cosmos (4) Galaxy

106. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards replication fork.

(2) The leading strand away from replication fork.

(3) The lagging strand away from the replication fork.

(4) The leading strand towards replication fork.

107. Infection of Ascaris occurs due to :

(1) Contaminated food and water (2) Mosquito bite

(3) Tse-tse fly (4) Sand fly

108. Name the process by which the nutritional quality of food crops is improved through biological means such as conventional plant breeding.

(1) Hybridization (2) Nutrification

(3) Bioaccumulation (4) Biofortification

109. In which of the following year the Yamuna Action Plan (YAP) was implemented ?

(1) 1987 (2) 1991 (3) 1993 (4) 1999

110. To remove negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying :

(1) Electrical field (2) Electric current

(3) Magnetic field (4) UV radiation

111. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein :

(1) Binds with epithelial cells of midgut of the pest ultimately killing it.

(2) Does not kill the carrier bacterium which is itself resistant to this toxin

(3) Is activated by acid pH of the foregut of the insect pest

(4) Is coded by several genes including the cry gene.

112. The common examples of temporary parasites includes :

(1) epiphytes (2) sucker fish

(3) bed bug, leech and mosquito (4) rhizobium

113. The succession taking place on rock is known as ..... .

(1) Hydrach (2) Xerach

(3) Monarch (4) None of the above

114. The term Alpha diversity refers to :

(1) Genetic diversity (2) Species diversity

(3) Ecosystem diversity (4) None of the above

115. Montreal protocol is related to the :

(1) Global warming (2) Ozone layer depletion

(3) Sustainable development (4) Greenhouse gases

116. Which one of the following taxonomic aids can give comprehensive account of complete compiled information of any one genus or family at a particular time ?

(1) Taxonomic key (2) Flora

(3) Herbarium (4) Monograph

117. In five kingdom system, the main basis of classification is :

(1) Structure of cell wall (2) Nutrition

(3) Structure of nucleus (4) Reproduction

118. Who proposed artificial system of classification ?

(1) John Ray (2) Lamarck (3) Linnaeus (4) Wallace

119. Flame cells present in Platyhelminthes, are specialized in :

(1) Respiration and adsorption (2) Respiration and excretion

(3) Osmoregulation and excretion (4) Sosmoregulation and circulation

120. Vexillary aestivation is characteristic of family :

(1) Fabaceae (2) Solanaceae (3) Liliaceae (4) Brassicaceae

121. Vessels and fibers occurs in :

(1) Xylem of angiosperms (2) Xylem of gymnosperms

(3) Xylem of pteridophytes (4) All of the above

122. Tendon and ligament are examples of :
(1) Loose connective tissues
(2) Special connective tissues
(3) Dense irregular connective tissues
(4) Dense regular connective tissues

123. Prokaryotic genetic system has :
(1) DNA but no histones
(2) Both DNA and histones
(3) Neither DNA nor histones
(4) Either DNA or histone

124. In order to enter the cell cycle of cell must be stimulated from outside. What type of molecule provides this stimulation ?
(1) Cyclins
(2) Cyclins-dependent kinases
(3) Cytokines and growth factors
(4) Tyrosine

125. The absorption of minerals due to difference in the electro potential gradient without use of energy is :
(1) Active absorption
(2) Passive absorption
(3) Osmotic absorption
(4) None of the above

126. Primary carboxylation occurs in C3 and C4 plants with the help of :
(1) PEP carboxylase and pyruvate carboxylase
(2) PEP carboxylase and RuBP carboxylasae
(3) RuBP carboxylasae and PEP carboxylase
(4) RuBP carboxylasae and pyruvate carboxylase

127. As compared to anaerobic respiration, the energy gained during aerobic respiration is :
(1) 8 times (2) 12 times (3) 19 times (4) 36 times

128. Fruit and leaf drop at early stages can be prevented by the application of :
(1) Cytokinins
(2) Ethylene
(3) Auxins
(4) Gibberellic acid

129. The dental formula for humans (as well as apes and some monkeys) is :
(1) 2-1-6-2 (2) 2-1-2-2 (3) 2-1-2-3 (4) 2-2-1-3

130. Total oxygen that can be carried by blood in :
(1) 1000-1200 ml
(2) 2000-3000 ml
(3) 200 ml
(4) 100 ml

Total No. of Printed Pages : 21

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

BPH-EE-2018(SET-Y)

B

10002

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)

SEAL

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 rest mass of a photon is :

(1) $\frac{h\nu}{c}$ (2) $\frac{h\nu}{c^2}$ (3) $\frac{hc}{\lambda}$ (4) zero

2. For nuclear fission to take place the neutrons must have :

(1) Very very low energy (2) Thermal energy

(3) Very high energy (4) No kinetic energy

3. The half value period of a radioactive nuclide is 3 hours. In 9 hours, it's activity will be reduced to :

(1) $\frac{1}{9}$ (2) $\frac{1}{27}$ (3) $\frac{1}{6}$ (4) $\frac{1}{8}$

4. Digital circuits can be made by repetitive use of :

(1) OR gate (2) AND gate (3) NOT gate (4) NAND gate

5. In a common base transistor amplifier the current gain is :

(1) One (2) More than one (3) Less than one (4) Infinite

6. The frequency of ultraviolet light is of the order of :

(1) 10^7 Hz (2) 10^{10} Hz (3) 10^{12} Hz (4) 10^{15} Hz

7. In Young's double slit experiment, nth bright fringe of red light ($\lambda_1 = 7500\ \mathring{A}$) coincides with (n + 1)th bright fringe of green light ($\lambda_2 = 6000\ \mathring{A}$). The value of n is :

(1) 4 (2) 5 (3) 3 (4) 2

8. An endoscope is employed to view the internal parts of the body. It is based on the principle of :

(1) Reflection (2) Refraction

(3) Total internal reflection (4) Dispersion

9. Focal lengths of objective and eye-piece of a telescope are 200 cm and 4 cm respectively. The length of the telescope in normal adjustment is :

(1) 196 cm (2) 204 cm (3) 250 cm (4) 225 cm

10. Which of the following series of hydrogen spectrum is in the visible region ?

(1) Lymann series (2) Balmer series

(3) Paschen series (4) Bracket series

11. Two cells, each of emf E and internal resistance r are connected in parallel across a resistor R. The power delivered to the resistor is maximum if :

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

12. A steel wire of length l has a magnetic moment M, it is bent into L shape from middle. The new magnetic moment is :

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

13. A proton, a deuteron and an α-particle enter a magnetic field perpendicular to it with same velocities. What is the ratio of radii of circular path ?

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

14. If the self-inductance of 500 turn coil is 125 mH, then the self-inductance of similar coil of 800 turns is :

(1) 48.8 mH (2) 200 mH (3) 187.5 mH (4) 320 mH

15. In an LCR circuit having L = 8 henry, C = 0.5 μF and R = 100 ohm in series, the resonance frequency in Hz is :

(1) 600 (2) 600π (3) $\frac{250}{\pi}$ (4) 5000

16. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. Then the ratio of their volume is :

(1) 3 : 2 (2) 4 : 9 (3) 9 : 4 (4) 27 : 8

17. A gas undergoes an adiabatic change it's specific heat in the process is :

(1) zero (2) 1 (3) ∞ (4) 0.5

18. At which of the following temperatures would the molecules of a gas have twice the average kinetic energy they have at 27°C ?

(1) 327°C (2) 377°C (3) 397°C (4) 587°C

19. A refrigerator absorbs 2000 cals of heat from ice trays. If coefficient of performance is 4, then work done by the motor is :

(1) 2100 J (2) 4200 J (3) 8400 J (4) 500 J

20. When the displacement is half of the amplitude, then what fraction of the total energy of a simple harmonic oscillator is kinetic ?

(1) $\frac{2}{7}$th (2) $\frac{3}{4}$th (3) $\frac{2}{9}$th (4) $\frac{5}{7}$th

21. A body is projected vertically up. At certain height h above the ground, it's P. E and K. E are in the ratio 1 : 4. At what height above the ground, P. E and K. E will be in the ratio 4 : 1 ?

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

22. Two bodies have their moments of inertia I and 2I respectively about the axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio :

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

23. The mass of a planet is six times that of the earth. The radius of the planet is twice that of the earth. If the escape velocity from the earth is v, then the escape velocity from the planet is :

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

24. If the earth shrinks such that it's mass does not change but radius decreases to one quarter of it's original value then one complete day will be of :

(1) 96 hrs (2) 48 hrs (3) 6 hrs (4) 1.5 hrs

25. A liquid will not wet the surface of a solid if its angle of contact is :

(1) zero (2) Less than 90°

(3) more than 90° (4) 90°

26. If σ is the Stefan's constant and b is the Wien's constant, then the dimensions of σb^4 are :

(1) $\left[M^0L^0T^0\right]$ (2) $\left[M^1L^{-2}T^1\right]$ (3) $\left[M^1L^6T^{-3}\right]$ (4) $\left[M^1L^4T^{-3}\right]$

27. A boy is hanging from a horizontal branch of a tree. The tension in the arms will be maximum when the angle between the arms is :

(1) 0° (2) 60° (3) 90° (4) 120°

28. A body is projected such that it's K.E at the top is $\frac{3}{4}$th of it's initial K. E. What is the angle of projection with horizontal ?

(1) 30° (2) 60° (3) 45° (4) 120°

29. A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of the 12 kg mass is 4 m/s. The kinetic energy of the other mass is :

(1) 288 J (2) 192 J (3) 96 J (4) 144 J

30. The potential energy of a long spring when stretched by 2 cm is u. If the spring is stretched by 8 cm, the potential energy stored in it is :

(1) $\frac{u}{4}$ (2) $4u$ (3) $16u$ (4) $8u$

31. A tuning fork produces 8 beats/sec with both, 80 and 70 cm of stretched wire of sonometer. Frequency of the fork is :

(1) 120 Hz (2) 128 Hz (3) 112 Hz (4) 240 Hz

32. A pipe closed at one end produces a fundamental note at 412 Hz. It is cut into two pieces of equal length. The fundamental frequencies produced in the two pieces are :

(1) 206 Hz, 412 Hz (2) 824 Hz, 1648 Hz

(3) 412 Hz, 824 Hz (4) 206 Hz, 824 Hz

33. An α-particle and a proton are accelerated through same potential difference from rest. The ratio of their final velocities is :

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

34. The resistance of a wire of uniform length L and diameter D is R. The resistance of another wire of same material but length $4L$ and diameter $2D$ will be :

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

35. A 10 μF capacitor is charged by a battery of emf 100 V. The energy drawn from the battery and the energy stored in the capacitor, are respectively :

(1) 0.10 J and 0.05 J (2) 0.05 J and 0.10 J

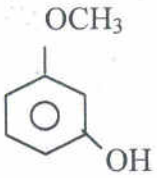
(3) 1.0 mJ and 0.5 mJ (4) 0.05 J and 0.05 J

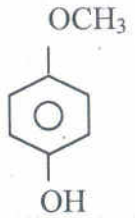
PART – B

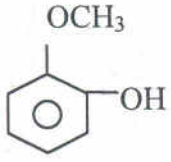
(CHEMISTRY)

36. In  $\xrightarrow{aq\ KOH}$ product

Product is :

(1) 

(2) 

(3) 

(4)  + CH_3OK (mixture)

37. $HC \equiv CH + 2HCHO \xrightarrow{-OCH_3} X$

X is :

(1) $HOH_2C - C \equiv C - CH_2OH$

(2) $HOH_2C - C \equiv C - CH_2OCH_3$

(3) Both are correct

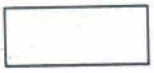
(4) None is correct

38. $H_2C = CH_2 \xrightarrow{h\nu} A$

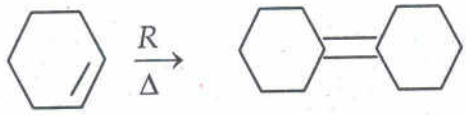
A is :

(1) $H_2C = CH - CH = CH_2$

(2) $H_3C - CH = CH - CH_2$

(3) 

(4) None is correct

39. 

A can be :

(1) Conc. H_2SO_4

(2) alcoholic KOH

(3) Et_3N

(4) t-BuOK

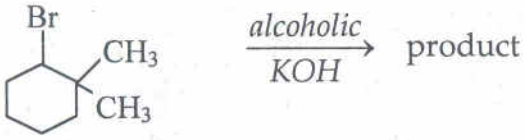
40. Identify the correct statement :

(1) Gypsum is obtained by heating Plaster of Paris

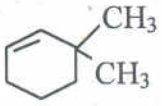
(2) Plaster of Paris can be obtained by hydration of gypsum

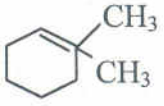
(3) Plaster of Paris contains higher percentage of calcium than does gypsum

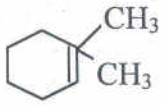
(4) Plaster of Paris is obtained from gypsum by oxidation

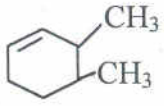
41. 

major product is :

(1) 

(2) 

(3) 

(4) 

42. Perchloroethane is :

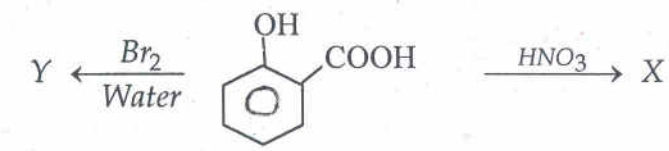
(1) $CH_3CH_2ClO_4$ (2) C_2Cl_6

(3) CH_3-CCl_3 (4) $CCl_3.CHO$

43. $C_3H_6Cl_2$ (A) $\xrightarrow[(iii)\ \Delta]{(i)\ KCN \\ (ii)\ H_3O^+}$ $H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$ A is :

(1) 1, 1 - dichloropropane (2) 1, 2-dichloropropane

(3) 2, 2 dichloropropane (4) 1, 3-dichloropropane

44. 

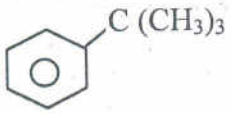
X and Y are :

(1) Picric acid, 2, 4, 6 - tribromophenol

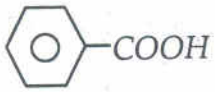
(2) 4-nitrosalicylic acid, 4-bromosalicylic acid

(3) o-nitrophenol, o-bromophenol

(4) None is correct

45. In  $\xrightarrow[\Delta]{KMnO_4}$ product

Product is :

(1) 

(2) $(CH_3)_3C-COOH$

(3) Both are correct

(4) None is correct

46. If ΔH of a reaction is 100 KJ mol^{-1}, then activation energy must be :

(1) Less than 100 KJ mol^{-1}

(2) Greater than 100 KJ mol^{-1}

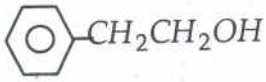
(3) Equal to 100 KJ mol^{-1}

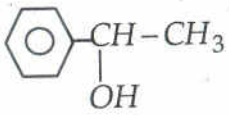
(4) None is correct

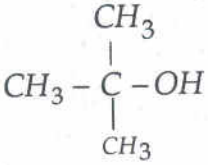
47. A gas expands against a constant external pressure of 2.00 atm, increasing its volume by 3.40 L. Simultaneously, the system absorbs 400 J of heat from its surroundings. What is ΔE, in joules for this gas ?

(1) –689 (2) + 289 (3) –289 (4) + 400

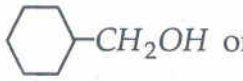
48. Which reacts faster with conc. HCl ?

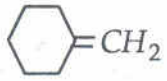
(1) 

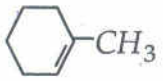
(2) 

(3) 

(4) $CH_2=CH-CH_2OH$

49.  on dehydration with conc. H_2SO_4 forms predominantly :

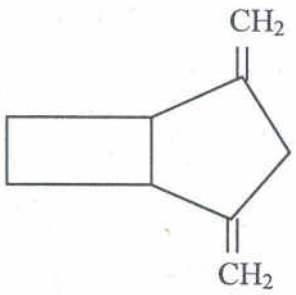
(1) 

(2) 

(3) 

(4) None of these

50. Degree of unsaturation in



is :

(1) 2 (2) 3 (3) 4 (4) 5

51. For an α-emitting isotope, the value of disintegration constant is 0.49×10^{-10} per year. The amount of the isotope of a given sample will reduce to half its value after a period (in years) of nearly :

(1) 0.45×10^{10} (2) 0.9×10^{10}

(3) 1.41×10^{10} (4) 2.82×10^{10}

52. Number of photons of light of wavelength 4000 $\mathring{A}$ required to provide 1.00 J of energy is :

(1) 2.01×10^{18} (2) 12.01×10^{31}

(3) 1.35×10^{17} (4) None is correct

53. Vander Waal's equation for one mole of CO_2 gas at low pressure will be :

(1) $\left(P+\frac{a}{V^2}\right)V=RT$ (2) $P(V-b)=RT-\frac{a}{V^2}$

(3) $P=\frac{RT}{V-b}$ (4) $P=\left(\frac{RT}{V-b}-\frac{a}{V^2}\right)$

54. A gas in an open container is heated from $27^\circ C$ to $127^\circ C$, the fraction of the original amount of gas remaining in the container will be :

(1) 3/4 (2) 1/2 (3) 1/4 (4) 1/8

55. The temperature at which a real gas obeys the ideal gas laws over a fairly wide range of pressure is :

(1) Critical temperature (2) Inversion temperature

(3) Boyle's temperature (4) Reduced temperature

56. Which of the following is not true for resonance ?

(1) Identical arrangement of atoms (2) Identical bonding

(3) Same no. of paired electron (4) Structure with same energies

57. The geometry of $Ni(CO)_4$ and $Ni(PPh_3)_2\ Cl_2$ are :

(1) Both square planar (2) Tetrahedral and square planar

(3) Both tetrahedral (4) Square planar and tetrahedral

58. The paramagnetism of O_2 molecule is believed to be due to the presence of two electrons with parallel spins in :

(1) Bonding π orbitals (2) Antibonding π orbitals

(3) Bonding σ orbitals (4) Antibonding σ orbitals

59. Trisoxalato aluminate (III) ion is :

(1) $[Al(C_2O_4)_3]$ (2) $[Al(C_2O_4)_3]^{3+}$

(3) $[Al(C_2O_4)_3]^{2-}$ (4) $Al[(C_2O_4)_3]^{3-}$

60. $[CrF_6]^{3-}$ has Cr atom ..... hybridized.

(1) sp^2d^2 (2) d^2sp^3 (3) $d\,sp^2$ (4) sp^3d

61. Atomic wt. of barium is 137.34. The equivalent weight of barium in $BaCrO_4$ used as oxidizing agent in acid medium is :

(1) 137.34 (2) 45.78 (3) 114.45 (4) 68.67

62. The density of 1 M solution of NaCl is 1.0585 g/ml. The molality of the solution is :

(1) 1.0585 (2) 1.00 (3) 0.10 (4) 0.0585

63. The strength of an Oxo acid (E-O-H) where E is the central atom, depends upon the :

(1) Electronegativity of E
(2) Atomic size of E
(3) Ability of E to share electron pair with O
(4) Atomic size and electronegativity of E.

64. $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$ I_2 obtained from 0.1 mole of $CuSO_4$ sample required 100 ml of 1 M hypo, hence mole percentage of pure $CuSO_4$ is :

(1) 100 (2) 50 (3) 25 (4) None is correct

65. The hybridization of carbon atoms in C – C single bond of $HC \equiv C - CH = CH_2$ is :

(1) $sp^3 - sp^3$ (2) $sp - sp^2$
(3) $sp^2 - sp^2$ (4) $sp^3 - sp$

66. What is normality of 0.30 M H_3PO_4 (a tribasic acid) in the following reaction ?

$H_3PO_4 + 2OH^- \rightarrow HPO_4^{2-} + 2H_2O$

(1) 0.30 N (2) 0.60 N (3) 0.90 N (4) 0.15 N

67. At $25^\circ C$, the vapour pressure of pure methyl alcohol is 92.0 torr. Mole fraction of CH_3OH in a solution in which vapour pressure of CH_3OH is 23.0 torr at $25^\circ C$ is :

(1) 0.25 (2) 0.75 (3) 0.50 (4) 0.66

68. Which has maximum osmotic pressure at temperature T ?

(1) 100 ml of 1 M urea solution

(2) 300 ml of 1 M glucose solution

(3) Mixture of 100 ml of 1 M urea solution and 300 ml of 1M glucose solution

(4) All are isotonic

69. Rate constant of a reaction is 0.0693 min^{-1}, starting with 10 mol, rate of reaction after 10 min is :

(1) 0.693 mol min^{-1}

(2) 0.0693×2 mol min^{-1}

(3) 0.0693×5 mol min^{-1}

(4) $0.0693 \times (5)^2$ mol min^{-1}

70. Equilibrium constant for the reaction :

$$NH_4OH + H^+ \rightleftharpoons NH_4^+ + H_2O$$

is 1.8×10^9. Hence equilibrium constant for $NH_3(aq) + H_2O \rightleftharpoons NH_4^+ + {}^-OH$ is :

(1) 1.8×10^{-5} (2) 1.8×10^5 (3) 1.8×10^{-9} (4) 5.55×10^{-10}

OPTIONAL

PART – C (i)

(MATHEMATICS)

71. A random variable X has the following probability distribution values of X :

X :	1	2	3	4	5
P(X) :	k	3k	2k	k	2k

Then the value of $P(X < 3)$ is :

(1) $\frac{6}{9}$ (2) $\frac{1}{9}$ (3) $\frac{4}{9}$ (4) $\frac{7}{9}$

72. A unit vector perpendicular to each of the vectors $-6\hat{i}+8\hat{k}$ and $8\hat{i}+6\hat{k}$ forming a right handed system is :

(1) $\hat{j}$ (2) $-\hat{j}$

(3) $\frac{1}{10}(6\hat{i}+8\hat{k})$ (4) $\frac{1}{10}(-6\hat{i}+8\hat{k})$

73. Which of the following is ***not*** associated with any LPP ?

(1) Feasible Solution (2) Optimum Solution

(3) Basic Solution (4) None of these

74. The distance of the plane $2x-3y+6z+14=0$ from the origin is :

(1) 14 (2) 2 (3) –2 (4) 11

75. The direction cosines of the line joining the points (4, 3, – 5) and (–2, 1, – 8) are :

(1) $<2, 4, -13>$ (2) $<6, 2, 3>$ (3) $<\frac{6}{7}, \frac{2}{7}, \frac{3}{7}>$ (4) None of these

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

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

(3) $\frac{\log x}{(1-\log x)}$ (4) $\log x(\log ex)^{-1}$

77. If x be real, the minimum value of $x^2-8x+17$ is :

(1) –1 (2) 0 (3) 1 (4) 2

78. The value of $\int \frac{2e^x}{e^{2x}+1}dx$ is equal to :

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

(3) $\log(1+e^{2x})+c$ (4) $\tan^{-1}(2e^x+1)+c$

79. The area bounded by the curve $y^2 = 4x$ and $x^2 = 4y$ is :

(1) $\frac{16}{3}$ sq. units

(2) $\frac{3}{16}$ sq. units

(3) $\frac{14}{3}$ sq. units

(4) $\frac{3}{14}$ sq. units

80. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is :

(1) $x + y = \frac{x^2}{2} + c$

(2) $xy = \frac{1}{4}x^4 + c$

(3) $x - y = \frac{1}{3}x^3 + c$

(4) $y - x = \frac{1}{4}x^4 + c$

81. Domain of the function $y = \sqrt{4 - x^2}$ is :

(1) $R - [0, 2]$, where R is the set of real numbers

(2) $[-2, 2]$

(3) $[0, 2]$

(4) $(-\infty, -2) \cup (2, \infty)$

82. Let X be the universal set for sets A and B. If $n(A) = 200$, $n(B) = 300$ and $n(A \cap B) = 100$, $n(A^c \cap B^c) = 300$, then $n(X)$ is equal to :

(1) 500 (2) 600 (3) 700 (4) 400

83. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{2}{3}\right)\right]$ is :

(1) $\frac{17}{6}$ (2) $\frac{16}{7}$ (3) $\frac{6}{17}$ (4) None of these

84. If $\sec A + \tan A = \frac{3}{2}$, then :

(1) $\sin A = \frac{12}{13}$

(2) $\sin 2A = \frac{5}{13}$

(3) $\sin A = \frac{5}{13}$

(4) $\sin 2A = \frac{12}{13}$

85. If n is a positive integer, then $2.4^{2n+1}+3^{3n+1}$ is divisible by :

(1) 27 (2) 11 (3) 2 (4) 9

86. If $\frac{1}{b+c}, \frac{1}{c+a}$ and $\frac{1}{a+b}$ are in A. P., then a^2, b^2 and c^2 are in :

(1) Geometric Progression (2) Arithmetic Progression

(3) Harmonic Progression (4) None of these

87. The equation of the straight line passing through the point (2, 3) and making intercepts on axes equal in magnitude and sign is :

(1) $x+y=3$ (2) $x-y=5$ (3) $x+y=-5$ (4) $x+y=5$

88. The foci of an ellipse are $(\pm 4, 0)$ and vertices at $(\pm 5, 0)$. Then the equation of the ellipse is :

(1) $\frac{x^2}{25}+\frac{y^2}{9}=1$ (2) $\frac{x^2}{9}+\frac{y^2}{16}=1$

(3) $9x^2+25y^2=1$ (4) None of these

89. The point which divides the line joining the points (2, 4, 5) and (3,5,–4) in the ratio $-2:3$ lies on :

(1) ZOX plane (2) XOY plane (3) YOZ plane (4) None of these

90. The value of $\lim_{x\to 0}\frac{x}{1-\sqrt{1-x}}$ is :

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

91. Which is not correct ?

(1) Each of the two complex roots of unity is the square of the other.

(2) Sum of the three cube roots of unity is zero.

(3) Product of the three cube roots of unity is one.

(4) None of these

92. If $(1+i)$ is a root of the equation $x^2+ax+2=0$. where $a \in R$, then the value of 'a' is :

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

93. Solution set of inequality $|3x-2| \leq \frac{1}{2}$ is :

(1) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (2) $\left[\frac{1}{2}, \frac{5}{6}\right]$

(3) $\left[-\frac{1}{2}, \frac{3}{2}\right]$ (4) $\left[\frac{3}{2}, \frac{5}{2}\right]$

94. Sum of all the odd divisors of 720 is :

(1) 78 (2) 76 (3) 84 (4) 80

95. The binomial co-efficient of the 4th term in the expansion of $(x-q)^5$ is :

(1) 5 (2) 15 (3) 10 (4) 20

96. If $x = a\cos^3\theta, y = a\sin^3\theta$, then $\frac{dy}{dx}$ is equal to :

(1) cot t (2) cos t (3) tan t (4) $-$ tan t

97. If X, M, Z are denoting Mean, median and mode of a data and $X : M = 9 : 8$, then the ratio M : Z is given by :

(1) 8 : 9 (2) 4 : 3 (3) 7 : 6 (4) 5 : 4

98. Two dice are rolled together, the probability that the total score on the two dice is greater than 10 is given by :

(1) $\frac{1}{4}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{5}{6}$

99. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then A^2+2A is equal to :

(1) $3A$ (2) $4A$ (3) $2A$ (4) A

100. The value of the determinant

$$\begin{vmatrix} 1 & x & y+z \\ 1 & y & z+x \\ 1 & z & x+y \end{vmatrix}$$ is :

(1) $x+y+z$ (2) 0 (3) 1 (4) $(1+x+y+z)$

OPTIONAL

PART – C (ii)

(BIOLOGY)

101. Primary carboxylation occurs in C3 and C4 plants with the help of :

(1) PEP carboxylase and pyruvate carboxylase

(2) PEP carboxylase and RuBP carboxylasae

(3) RuBP carboxylasae and PEP carboxylase

(4) RuBP carboxylasae and pyruvate carboxylase

102. As compared to anaerobic respiration, the energy gained during aerobic respiration is :

(1) 8 times (2) 12 times (3) 19 times (4) 36 times

103. Fruit and leaf drop at early stages can be prevented by the application of :

(1) Cytokinins (2) Ethylene

(3) Auxins (4) Gibberellic acid

104. The dental formula for humans (as well as apes and some monkeys) is :

(1) 2-1-6-2 (2) 2-1-2-2 (3) 2-1-2-3 (4) 2-2-1-3

105. Total oxygen that can be carried by blood in :

(1) 1000-1200 ml (2) 2000-3000 ml

(3) 200 ml (4) 100 ml

106. Vessels and fibers occurs in :

(1) Xylem of angiosperms (2) Xylem of gymnosperms

(3) Xylem of pteridophytes (4) All of the above

107. Tendon and ligament are examples of :

(1) Loose connective tissues (2) Special connective tissues

(3) Dense irregular connective tissues (4) Dense regular connective tissues

108. Prokaryotic genetic system has :

(1) DNA but no histones (2) Both DNA and histones

(3) Neither DNA nor histones (4) Either DNA or histone

109. In order to enter the cell cycle of cell must be stimulated from outside. What type of molecule provides this stimulation ?

(1) Cyclins (2) Cyclins-dependent kinases

(3) Cytokines and growth factors (4) Tyrosine

110. The absorption of minerals due to difference in the electro potential gradient without use of energy is :

(1) Active absorption (2) Passive absorption

(3) Osmotic absorption (4) None of the above

111. Which of the following is developed by parthenogenesis ?

(1) Drones (2) Queen honey bee

(3) Worker honey bee (4) Both (2) and (3)

112. Apomixis is a type of reproduction that results in the development of a/an :

(1) New organism without fusion of gametes.

(2) New organisms from fusion products of gametes

(3) Embryo from endosperm

(4) Embryo from nucleus

113. Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy ?

(1) Six weeks (2) Eight weeks (3) Twelve weeks (4) Eighteen weeks

114. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called :

(1) Aneuploidy (2) Polyploidy

(3) Klinfelter's & Turner's syndrome (4) Monosomy

115. The clouds of cosmic dust and gases from which the entire solar system is believed to be formed by condensation, is called :

(1) Ylem (2) Whey (3) Cosmos (4) Galaxy

116. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein :

(1) Binds with epithelial cells of midgut of the pest ultimately killing it.

(2) Does not kill the carrier bacterium which is itself resistant to this toxin

(3) Is activated by acid pH of the foregut of the insect pest

(4) Is coded by several genes including the cry gene.

117. The common examples of temporary parasites includes :

(1) epiphytes (2) sucker fish

(3) bed bug, leech and mosquito (4) rhizobium

118. The succession taking place on rock is known as ..... .

(1) Hydrach (2) Xerach

(3) Monarch (4) None of the above

119. The term Alpha diversity refers to :

(1) Genetic diversity (2) Species diversity

(3) Ecosystem diversity (4) None of the above

120. Montreal protocol is related to the :

(1) Global warming (2) Ozone layer depletion

(3) Sustainable development (4) Greenhouse gases

121. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards replication fork.

(2) The leading strand away from replication fork.

(3) The lagging strand away from the replication fork.

(4) The leading strand towards replication fork.

122. Infection of Ascaris occurs due to :

(1) Contaminated food and water (2) Mosquito bite

(3) Tse-tse fly (4) Sand fly

123. Name the process by which the nutritional quality of food crops is improved through biological means such as conventional plant breeding.

(1) Hybridization (2) Nutrification

(3) Bioaccumulation (4) Biofortification

124. In which of the following year the Yamuna Action Plan (YAP) was implemented ?

(1) 1987 (2) 1991 (3) 1993 (4) 1999

125. To remove negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying :

(1) Electrical field (2) Electric current

(3) Magnetic field (4) UV radiation

126. Which one of the following taxonomic aids can give comprehensive account of complete compiled information of any one genus or family at a particular time ?

(1) Taxonomic key (2) Flora

(3) Herbarium (4) Monograph

127. In five kingdom system, the main basis of classification is :

(1) Structure of cell wall (2) Nutrition

(3) Structure of nucleus (4) Reproduction

128. Who proposed artificial system of classification ?

(1) John Ray (2) Lamarck (3) Linnaeus (4) Wallace

129. Flame cells present in Platyhelminthes, are specialized in :

(1) Respiration and adsorption (2) Respiration and excretion

(3) Osmoregulation and excretion (4) Sosmoregulation and circulation

130. Vexillary aestivation is characteristic of family :

(1) Fabaceae (2) Solanaceae (3) Liliaceae (4) Brassicaceae

Total No. of Printed Pages : 21

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BPH-EE-2018(SET-Y)

C

10043

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)

SEAL

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 frequency of ultraviolet light is of the order of :
   (1) 10^7 Hz (2) 10^{10} Hz (3) 10^{12} Hz (4) 10^{15} Hz

2. In Young's double slit experiment, nth bright fringe of red light ($\lambda_1 = 7500\ \mathring{A}$) coincides with (n + 1)th bright fringe of green light ($\lambda_2 = 6000\ \mathring{A}$). The value of n is :
   (1) 4 (2) 5 (3) 3 (4) 2

3. An endoscope is employed to view the internal parts of the body. It is based on the principle of :
   (1) Reflection (2) Refraction
   (3) Total internal reflection (4) Dispersion

4. Focal lengths of objective and eye-piece of a telescope are 200 cm and 4 cm respectively. The length of the telescope in normal adjustment is :
   (1) 196 cm (2) 204 cm (3) 250 cm (4) 225 cm

5. Which of the following series of hydrogen spectrum is in the visible region ?
   (1) Lymann series (2) Balmer series
   (3) Paschen series (4) Bracket series

6. Two cells, each of emf E and internal resistance r are connected in parallel across a resistor R. The power delivered to the resistor is maximum if :
   (1) $R = \frac{r}{2}$ (2) $R = r$ (3) $R = 2r$ (4) $R = 0$

7. A steel wire of length l has a magnetic moment M, it is bent into L shape from middle. The new magnetic moment is :
   (1) $\frac{M}{\sqrt{2}}$ (2) $\frac{M}{2}$ (3) $\sqrt{2}M$ (4) $2M$

8. A proton, a deuteron and an α-particle enter a magnetic field perpendicular to it with same velocities. What is the ratio of radii of circular path ?

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

9. If the self-inductance of 500 turn coil is 125 mH, then the self-inductance of similar coil of 800 turns is :

(1) 48.8 mH (2) 200 mH (3) 187.5 mH (4) 320 mH

10. In an LCR circuit having L = 8 henry, C = 0.5 μF and R = 100 ohm in series, the resonance frequency in Hz is :

(1) 600 (2) 600π (3) $\frac{250}{\pi}$ (4) 5000

11. A tuning fork produces 8 beats/sec with both, 80 and 70 cm of stretched wire of sonometer. Frequency of the fork is :

(1) 120 Hz (2) 128 Hz (3) 112 Hz (4) 240 Hz

12. A pipe closed at one end produces a fundamental note at 412 Hz. It is cut into two pieces of equal length. The fundamental frequencies produced in the two pieces are :

(1) 206 Hz, 412 Hz (2) 824 Hz, 1648 Hz

(3) 412 Hz, 824 Hz (4) 206 Hz, 824 Hz

13. An α-particle and a proton are accelerated through same potential difference from rest. The ratio of their final velocities is :

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

14. The resistance of a wire of uniform length L and diameter D is R. The resistance of another wire of same material but length $4L$ and diameter $2D$ will be :

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

15. A 10 μF capacitor is charged by a battery of emf 100 V. The energy drawn from the battery and the energy stored in the capacitor, are respectively :

(1) 0.10 J and 0.05 J (2) 0.05 J and 0.10 J

(3) 1.0 mJ and 0.5 mJ (4) 0.05 J and 0.05 J

16. A body is projected vertically up. At certain height h above the ground, it's P. E and K. E are in the ratio 1 : 4. At what height above the ground, P. E and K. E will be in the ratio 4 : 1 ?

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

17. Two bodies have their moments of inertia I and 2I respectively about the axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio :

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

18. The mass of a planet is six times that of the earth. The radius of the planet is twice that of the earth. If the escape velocity from the earth is v, then the escape velocity from the planet is :

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

19. If the earth shrinks such that it's mass does not change but radius decreases to one quarter of it's original value then one complete day will be of :

(1) 96 hrs (2) 48 hrs (3) 6 hrs (4) 1.5 hrs

20. A liquid will not wet the surface of a solid if its angle of contact is :

(1) zero (2) Less than 90°

(3) more than 90° (4) 90°

21. If σ is the Stefan's constant and b is the Wien's constant, then the dimensions of σb^4 are :

(1) $\left[M^0L^0T^0\right]$ (2) $\left[M^1L^{-2}T^1\right]$

(3) $\left[M^1L^6T^{-3}\right]$ (4) $\left[M^1L^4T^{-3}\right]$

22. A boy is hanging from a horizontal branch of a tree. The tension in the arms will be maximum when the angle between the arms is :

(1) 0° (2) 60° (3) 90° (4) 120°

23. A body is projected such that it's K.E at the top is $\frac{3}{4}$th of it's initial K. E. What is the angle of projection with horizontal ?

(1) 30° (2) 60° (3) 45° (4) 120°

24. A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of the 12 kg mass is 4 m/s. The kinetic energy of the other mass is :

(1) 288 J (2) 192 J (3) 96 J (4) 144 J

25. The potential energy of a long spring when stretched by 2 cm is u. If the spring is stretched by 8 cm, the potential energy stored in it is :

(1) $\frac{u}{4}$ (2) $4u$ (3) $16u$ (4) $8u$

26. The rest mass of a photon is :

(1) $\frac{h\nu}{c}$ (2) $\frac{h\nu}{c^2}$ (3) $\frac{hc}{\lambda}$ (4) zero

27. For nuclear fission to take place the neutrons must have :

(1) Very very low energy (2) Thermal energy

(3) Very high energy (4) No kinetic energy

28. The half value period of a radioactive nuclide is 3 hours. In 9 hours, it's activity will be reduced to :

(1) $\frac{1}{9}$ (2) $\frac{1}{27}$ (3) $\frac{1}{6}$ (4) $\frac{1}{8}$

29. Digital circuits can be made by repetitive use of :

(1) OR gate (2) AND gate (3) NOT gate (4) NAND gate

30. In a common base transistor amplifier the current gain is :

(1) One (2) More than one (3) Less than one (4) Infinite

31. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. Then the ratio of their volume is :

(1) 3 : 2 (2) 4 : 9 (3) 9 : 4 (4) 27 : 8

32. A gas undergoes an adiabatic change it's specific heat in the process is :

(1) zero (2) 1 (3) ∞ (4) 0.5

33. At which of the following temperatures would the molecules of a gas have twice the average kinetic energy they have at 27°C ?

(1) 327°C (2) 377°C (3) 397°C (4) 587°C

34. A refrigerator absorbs 2000 cals of heat from ice trays. If coefficient of performance is 4, then work done by the motor is :

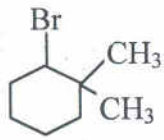
(1) 2100 J (2) 4200 J (3) 8400 J (4) 500 J

35. When the displacement is half of the amplitude, then what fraction of the total energy of a simple harmonic oscillator is kinetic ?

(1) $\frac{2}{7}$th (2) $\frac{3}{4}$th (3) $\frac{2}{9}$th (4) $\frac{5}{7}$th

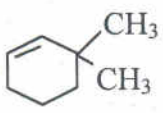
PART – B

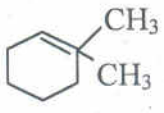
(CHEMISTRY)

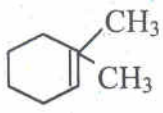
36. 

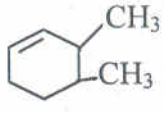
$\xrightarrow[KOH]{alcoholic}$ product

major product is :

(1) 

(2) 

(3) 

(4) 

37. Perchloroethane is :

(1) $CH_3CH_2ClO_4$

(2) C_2Cl_6

(3) CH_3-CCl_3

(4) $CCl_3.CHO$

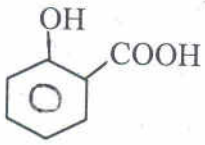
38. $\underset{A}{C_3H_6Cl_2} \xrightarrow[(iii)\ \Delta]{(i)\ KCN \\ (ii)\ H_3O^+} H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$ A is :

(1) 1, 1 - dichloropropane

(2) 1, 2-dichloropropane

(3) 2, 2 dichloropropane

(4) 1, 3-dichloropropane

39. $Y \xleftarrow[Water]{Br_2}$  $\xrightarrow{HNO_3} X$

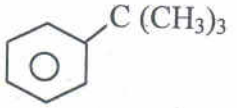
X and Y are :

(1) Picric acid, 2, 4, 6 - tribromophenol

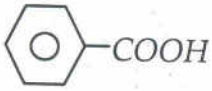
(2) 4-nitrosalicylic acid, 4-bromosalicylic acid

(3) o-nitrophenol, o-bromophenol

(4) None is correct

40. In  $\xrightarrow[\Delta]{KMnO_4}$ product

Product is :

(1) 

(2) $(CH_3)_3C-COOH$

(3) Both are correct

(4) None is correct

41. If ΔH of a reaction is 100 KJ mol^{-1}, then activation energy must be :

(1) Less than 100 KJ mol^{-1}

(2) Greater than 100 KJ mol^{-1}

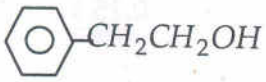
(3) Equal to 100 KJ mol^{-1}

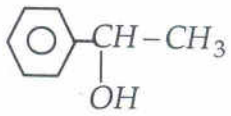
(4) None is correct

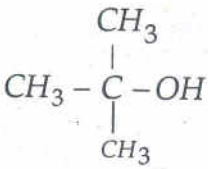
42. A gas expands against a constant external pressure of 2.00 atm, increasing its volume by 3.40 L. Simultaneously, the system absorbs 400 J of heat from its surroundings. What is ΔE, in joules for this gas ?

(1) –689 (2) + 289 (3) –289 (4) + 400

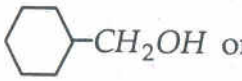
43. Which reacts faster with conc. HCl ?

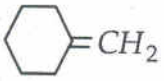
(1) 

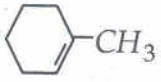
(2) 

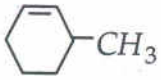
(3) 

(4) $CH_2 = CH - CH_2OH$

44.  on dehydration with conc. H_2SO_4 forms predominantly :

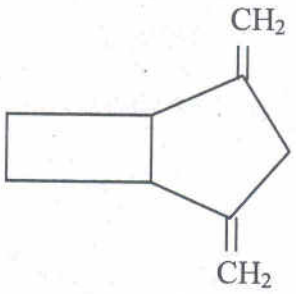
(1) 

(2) 

(3) 

(4) None of these

45. Degree of unsaturation in



is :

(1) 2 (2) 3 (3) 4 (4) 5

46. What is normality of 0.30 M H_3PO_4 (a tribasic acid) in the following reaction ?

$$H_3PO_4 + 2OH^- \rightarrow HPO_4^{2-} + 2H_2O$$

(1) 0.30 N (2) 0.60 N (3) 0.90 N (4) 0.15 N

47. At $25^\circ C$, the vapour pressure of pure methyl alcohol is 92.0 torr. Mole fraction of CH_3OH in a solution in which vapour pressure of CH_3OH is 23.0 torr at $25^\circ C$ is :

(1) 0.25 (2) 0.75 (3) 0.50 (4) 0.66

48. Which has maximum osmotic pressure at temperature T ?

(1) 100 ml of 1 M urea solution

(2) 300 ml of 1 M glucose solution

(3) Mixture of 100 ml of 1 M urea solution and 300 ml of 1M glucose solution

(4) All are isotonic

49. Rate constant of a reaction is 0.0693 min^{-1}, starting with 10 mol, rate of reaction after 10 min is :

(1) 0.693 mol min^{-1} (2) 0.0693×2 mol min^{-1}

(3) 0.0693×5 mol min^{-1} (4) $0.0693 \times (5)^2$ mol min^{-1}

50. Equilibrium constant for the reaction :

$$NH_4OH + H^+ \rightleftharpoons NH_4^+ + H_2O$$

is 1.8×10^9. Hence equilibrium constant for $NH_3(aq) + H_2O \rightleftharpoons NH_4^+ + {}^-OH$ is :

(1) 1.8×10^{-5} (2) 1.8×10^5 (3) 1.8×10^{-9} (4) 5.55×10^{-10}

51. Which of the following is not true for resonance ?

(1) Identical arrangement of atoms (2) Identical bonding
(3) Same no. of paired electron (4) Structure with same energies

52. The geometry of $Ni(CO)_4$ and $Ni(PPh_3)_2\ Cl_2$ are :

(1) Both square planar (2) Tetrahedral and square planar
(3) Both tetrahedral (4) Square planar and tetrahedral

53. The paramagnetism of O_2 molecule is believed to be due to the presence of two electrons with parallel spins in :

(1) Bonding π orbitals (2) Antibonding π orbitals
(3) Bonding σ orbitals (4) Antibonding σ orbitals

54. Trisoxalato aluminate (III) ion is :

(1) $[Al(C_2O_4)_3]$ (2) $[Al(C_2O_4)_3]^{3+}$
(3) $[Al(C_2O_4)_3]^{2-}$ (4) $Al[(C_2O_4)_3]^{3-}$

55. $[CrF_6]^{3-}$ has Cr atom ..... hybridized.

(1) sp^2d^2 (2) d^2sp^3 (3) $d\,sp^2$ (4) sp^3d

56. Atomic wt. of barium is 137.34. The equivalent weight of barium in $BaCrO_4$ used as oxidizing agent in acid medium is :

(1) 137.34 (2) 45.78 (3) 114.45 (4) 68.67

57. The density of 1 M solution of NaCl is 1.0585 g/ml. The molality of the solution is :

(1) 1.0585 (2) 1.00 (3) 0.10 (4) 0.0585

58. The strength of an Oxo acid (E-O-H) where E is the central atom, depends upon the :

(1) Electronegativity of E

(2) Atomic size of E

(3) Ability of E to share electron pair with O

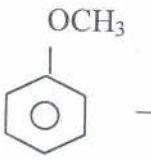
(4) Atomic size and electronegativity of E.

59. $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$ I_2 obtained from 0.1 mole of $CuSO_4$ sample required 100 ml of 1 M hypo, hence mole percentage of pure $CuSO_4$ is :

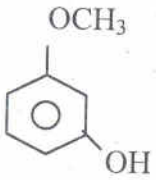
(1) 100 (2) 50 (3) 25 (4) None is correct

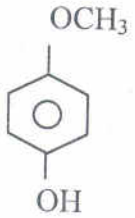
60. The hybridization of carbon atoms in C – C single bond of $HC \equiv C - CH = CH_2$ is :

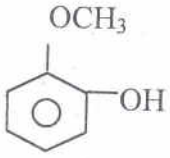
(1) $sp^3 - sp^3$ (2) $sp - sp^2$ (3) $sp^2 - sp^2$ (4) $sp^3 - sp$

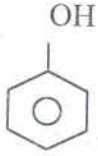
61. In  $\xrightarrow{aq\ KOH}$ product

Product is :

(1) 

(2) 

(3) 

(4)  + CH_3OK (mixture)

62. $HC \equiv CH + 2HCHO \xrightarrow{-OCH_3} X$

X is :

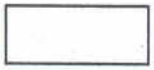
(1) $HOH_2C - C \equiv C - CH_2OH$ (2) $HOH_2C - C \equiv C - CH_2OCH_3$

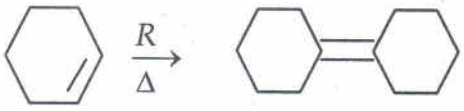
(3) Both are correct (4) None is correct

63. $H_2C = CH_2 \xrightarrow{h\nu} A$

A is :

(1) $H_2C = CH - CH = CH_2$ (2) $H_3C - CH = CH - CH_2$

(3)  (4) None is correct

64. 

A can be :

(1) Conc. H_2SO_4 (2) alcoholic KOH

(3) Et_3N (4) t-BuOK

65. Identify the correct statement :

(1) Gypsum is obtained by heating Plaster of Paris

(2) Plaster of Paris can be obtained by hydration of gypsum

(3) Plaster of Paris contains higher percentage of calcium than does gypsum

(4) Plaster of Paris is obtained from gypsum by oxidation

66. For an α-emitting isotope, the value of disintegration constant is 0.49×10^{-10} per year. The amount of the isotope of a given sample will reduce to half its value after a period (in years) of nearly :

(1) 0.45×10^{10} (2) 0.9×10^{10} (3) 1.41×10^{10} (4) 2.82×10^{10}

67. Number of photons of light of wavelength 4000 $\mathring{A}$ required to provide 1.00 J of energy is :

(1) 2.01×10^{18} (2) 12.01×10^{31} (3) 1.35×10^{17} (4) None is correct

68. Vander Waal's equation for one mole of CO_2 gas at low pressure will be :

(1) $\left(P+\frac{a}{V^2}\right)V=RT$ (2) $P(V-b)=RT-\frac{a}{V^2}$

(3) $P=\frac{RT}{V-b}$ (4) $P=\left(\frac{RT}{V-b}-\frac{a}{V^2}\right)$

69. A gas in an open container is heated from $27^\circ C$ to $127^\circ C$, the fraction of the original amount of gas remaining in the container will be :

(1) 3/4 (2) 1/2 (3) 1/4 (4) 1/8

70. The temperature at which a real gas obeys the ideal gas laws over a fairly wide range of pressure is :

(1) Critical temperature (2) Inversion temperature

(3) Boyle's temperature (4) Reduced temperature

OPTIONAL

PART – C (i)

(MATHEMATICS)

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

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

(3) $\frac{\log x}{(1-\log x)}$ (4) $\log x(\log ex)^{-1}$

72. If x be real, the minimum value of $x^2-8x+17$ is :

(1) –1 (2) 0 (3) 1 (4) 2

73. The value of $\int \frac{2e^x}{e^{2x}+1}\,dx$ is equal to :

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

(3) $\log(1 + e^{2x}) + c$ (4) $\tan^{-1}(2e^x + 1) + c$

74. The area bounded by the curve $y^2 = 4x$ and $x^2 = 4y$ is :

(1) $\frac{16}{3}$ sq. units (2) $\frac{3}{16}$ sq. units

(3) $\frac{14}{3}$ sq. units (4) $\frac{3}{14}$ sq. units

75. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is :

(1) $x + y = \frac{x^2}{2} + c$ (2) $xy = \frac{1}{4}x^4 + c$

(3) $x - y = \frac{1}{3}x^3 + c$ (4) $y - x = \frac{1}{4}x^4 + c$

76. If $x = a\cos^3\theta, y = a\sin^3\theta$, then $\frac{dy}{dx}$ is equal to :

(1) cot t (2) cos t (3) tan t (4) – tan t

77. If X, M, Z are denoting Mean, median and mode of a data and $X : M = 9 : 8$, then the ratio M : Z is given by :

(1) 8 : 9 (2) 4 : 3 (3) 7 : 6 (4) 5 : 4

78. Two dice are rolled together, the probability that the total score on the two dice is greater than 10 is given by :

(1) $\frac{1}{4}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{5}{6}$

79. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then $A^2 + 2A$ is equal to :

(1) $3A$ (2) $4A$ (3) $2A$ (4) A

80. The value of the determinant

$$\begin{vmatrix} 1 & x & y+z \\ 1 & y & z+x \\ 1 & z & x+y \end{vmatrix} \text{ is :}$$

(1) $x+y+z$ (2) 0 (3) 1 (4) $(1+x+y+z)$

81. Which is not correct ?

(1) Each of the two complex roots of unity is the square of the other.

(2) Sum of the three cube roots of unity is zero.

(3) Product of the three cube roots of unity is one.

(4) None of these

82. If $(1+i)$ is a root of the equation $x^2+ax+2=0$. where $a \in R$, then the value of 'a' is :

(1) –2 (2) 2 (3) 1 (4) –1

83. Solution set of inequality $|3x-2| \leq \frac{1}{2}$ is :

(1) $\left[-\frac{1}{2}, \frac{1}{2}\right]$. (2) $\left[\frac{1}{2}, \frac{5}{6}\right]$ (3) $\left[-\frac{1}{2}, \frac{3}{2}\right]$ (4) $\left[\frac{3}{2}, \frac{5}{2}\right]$

84. Sum of all the odd divisors of 720 is :

(1) 78 (2) 76 (3) 84 (4) 80

85. The binomial co-efficient of the 4th term in the expansion of $(x-q)^5$ is :

(1) 5 (2) 15 (3) 10 (4) 20

86. Domain of the function $y=\sqrt{4-x^2}$ is :

(1) $R-[0,\ 2]$, where R is the set of real numbers

(2) $[-2, 2]$

(3) $[0, 2]$

(4) $(-\infty, -2) \cup (2, \infty)$

87. Let X be the universal set for sets A and B. If $n(A)=200, n(B)=300$ and $n(A\cap B)=100$, $n(A^c\cap B^c)=300$, then $n(X)$ is equal to :

(1) 500 (2) 600 (3) 700 (4) 400

88. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{2}{3}\right)\right]$ is :

(1) $\frac{17}{6}$ (2) $\frac{16}{7}$ (3) $\frac{6}{17}$ (4) None of these

89. If $\sec A+\tan A=\frac{3}{2}$, then :

(1) $\sin A=\frac{12}{13}$ (2) $\sin 2A=\frac{5}{13}$

(3) $\sin A=\frac{5}{13}$ (4) $\sin 2A=\frac{12}{13}$

90. If n is a positive integer, then $2.4^{2n+1}+3^{3n+1}$ is divisible by :

(1) 27 (2) 11 (3) 2 (4) 9

91. A random variable X has the following probability distribution values of X :

X :	1	2	3	4	5
P(X) :	k	3k	2k	k	2k

Then the value of $P(X<3)$ is :

(1) $\frac{6}{9}$ (2) $\frac{1}{9}$ (3) $\frac{4}{9}$ (4) $\frac{7}{9}$

92. A unit vector perpendicular to each of the vectors $-6\hat{i}+8\hat{k}$ and $8\hat{i}+6\hat{k}$ forming a right handed system is :

(1) $\hat{j}$ (2) $-\hat{j}$

(3) $\frac{1}{10}(6\hat{i}+8\hat{k})$ (4) $\frac{1}{10}(-6\hat{i}+8\hat{k})$

93. Which of the following is ***not*** associated with any LPP ?

(1) Feasible Solution (2) Optimum Solution

(3) Basic Solution (4) None of these

94. The distance of the plane $2x-3y+6z+14=0$ from the origin is :

(1) 14 (2) 2 (3) –2 (4) 11

95. The direction cosines of the line joining the points (4, 3, – 5) and (–2, 1, – 8) are :

(1) $<2,4,-13>$ (2) $<6,2,3>$ (3) $<\frac{6}{7},\frac{2}{7},\frac{3}{7}>$ (4) None of these

96. If $\frac{1}{b+c},\frac{1}{c+a}$ and $\frac{1}{a+b}$ are in A. P., then a^2, b^2 and c^2 are in :

(1) Geometric Progression (2) Arithmetic Progression

(3) Harmonic Progression (4) None of these

97. The equation of the straight line passing through the point (2, 3) and making intercepts on axes equal in magnitude and sign is :

(1) $x+y=3$ (2) $x-y=5$ (3) $x+y=-5$ (4) $x+y=5$

98. The foci of an ellipse are $(\pm 4, 0)$ and vertices at $(\pm 5, 0)$. Then the equation of the ellipse is :

(1) $\frac{x^2}{25}+\frac{y^2}{9}=1$ (2) $\frac{x^2}{9}+\frac{y^2}{16}=1$

(3) $9x^2+25y^2=1$ (4) None of these

99. The point which divides the line joining the points (2, 4, 5) and (3,5,–4) in the ratio $-2:3$ lies on :

(1) ZOX plane (2) XOY plane

(3) YOZ plane (4) None of these

100. The value of $\lim_{x \to 0} \frac{x}{1-\sqrt{1-x}}$ is :

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

OPTIONAL

PART – C (ii)

(BIOLOGY)

101. Vessels and fibers occurs in :

(1) Xylem of angiosperms (2) Xylem of gymnosperms

(3) Xylem of pteridophytes (4) All of the above

102. Tendon and ligament are examples of :

(1) Loose connective tissues (2) Special connective tissues

(3) Dense irregular connective tissues (4) Dense regular connective tissues

103. Prokaryotic genetic system has :

(1) DNA but no histones (2) Both DNA and histones

(3) Neither DNA nor histones (4) Either DNA or histone

104. In order to enter the cell cycle of cell must be stimulated from outside. What type of molecule provides this stimulation ?

(1) Cyclins (2) Cyclins-dependent kinases

(3) Cytokines and growth factors (4) Tyrosine

105. The absorption of minerals due to difference in the electro potential gradient without use of energy is :

(1) Active absorption (2) Passive absorption

(3) Osmotic absorption (4) None of the above

106. Which one of the following taxonomic aids can give comprehensive account of complete compiled information of any one genus or family at a particular time ?

(1) Taxonomic key (2) Flora

(3) Herbarium (4) Monograph

107. In five kingdom system, the main basis of classification is :

(1) Structure of cell wall (2) Nutrition

(3) Structure of nucleus (4) Reproduction

108. Who proposed artificial system of classification ?

(1) John Ray (2) Lamarck (3) Linnaeus (4) Wallace

109. Flame cells present in Platyhelminthes, are specialized in :

(1) Respiration and adsorption (2) Respiration and excretion

(3) Osmoregulation and excretion (4) Sosmoregulation and circulation

110. Vexillary aestivation is characteristic of family :

(1) Fabaceae (2) Solanaceae (3) Liliaceae (4) Brassicaceae

111. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards replication fork.

(2) The leading strand away from replication fork.

(3) The lagging strand away from the replication fork.

(4) The leading strand towards replication fork.

112. Infection of Ascaris occurs due to :

(1) Contaminated food and water (2) Mosquito bite

(3) Tse-tse fly (4) Sand fly

113. Name the process by which the nutritional quality of food crops is improved through biological means such as conventional plant breeding.

(1) Hybridization (2) Nutrification

(3) Bioaccumulation (4) Biofortification

114. In which of the following year the Yamuna Action Plan (YAP) was implemented ?

(1) 1987 (2) 1991 (3) 1993 (4) 1999

115. To remove negatively charged molecules through matrix of agarose, nucleic aci molecules are separated by applying :

(1) Electrical field (2) Electric current

(3) Magnetic field (4) UV radiation

116. Which of the following is developed by parthenogenesis ?

(1) Drones
(2) Queen honey bee
(3) Worker honey bee
(4) Both (2) and (3)

117. Apomixis is a type of reproduction that results in the development of a/an :

(1) New organism without fusion of gametes.
(2) New organisms from fusion products of gametes
(3) Embryo from endosperm
(4) Embryo from nucleus

118. Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy ?

(1) Six weeks (2) Eight weeks (3) Twelve weeks (4) Eighteen weeks

119. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called :

(1) Aneuploidy
(2) Polyploidy
(3) Klinfelter's & Turner's syndrome
(4) Monosomy

120. The clouds of cosmic dust and gases from which the entire solar system is believed to be formed by condensation, is called :

(1) Ylem (2) Whey (3) Cosmos (4) Galaxy

121. Primary carboxylation occurs in C3 and C4 plants with the help of :

(1) PEP carboxylase and pyruvate carboxylase
(2) PEP carboxylase and RuBP carboxylasae
(3) RuBP carboxylasae and PEP carboxylase
(4) RuBP carboxylasae and pyruvate carboxylase

122. As compared to anaerobic respiration, the energy gained during aerobic respiration is :

(1) 8 times (2) 12 times (3) 19 times (4) 36 times

123. Fruit and leaf drop at early stages can be prevented by the application of :

(1) Cytokinins
(2) Ethylene
(3) Auxins
(4) Gibberellic acid

124. The dental formula for humans (as well as apes and some monkeys) is :

(1) 2-1-6-2 (2) 2-1-2-2 (3) 2-1-2-3 (4) 2-2-1-3

125. Total oxygen that can be carried by blood in :

(1) 1000-1200 ml (2) 2000-3000 ml

(3) 200 ml (4) 100 ml

126. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein :

(1) Binds with epithelial cells of midgut of the pest ultimately killing it.

(2) Does not kill the carrier bacterium which is itself resistant to this toxin

(3) Is activated by acid pH of the foregut of the insect pest

(4) Is coded by several genes including the cry gene.

127. The common examples of temporary parasites includes :

(1) epiphytes (2) sucker fish

(3) bed bug, leech and mosquito (4) rhizobium

128. The succession taking place on rock is known as ..... .

(1) Hydrach (2) Xerach

(3) Monarch (4) None of the above

129. The term Alpha diversity refers to :

(1) Genetic diversity (2) Species diversity

(3) Ecosystem diversity (4) None of the above

130. Montreal protocol is related to the :

(1) Global warming (2) Ozone layer depletion

(3) Sustainable development (4) Greenhouse gases

Total No. of Printed Pages : 21

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

BPH-EE-2018(SET-Y)

D

Sr. No. 10036

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. Two cells, each of emf E and internal resistance r are connected in parallel across a resistor R. The power delivered to the resistor is maximum if :

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

2. A steel wire of length l has a magnetic moment M, it is bent into L shape from middle. The new magnetic moment is :

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

3. A proton, a deuteron and an α-particle enter a magnetic field perpendicular to it with same velocities. What is the ratio of radii of circular path ?

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

4. If the self-inductance of 500 turn coil is 125 mH, then the self-inductance of similar coil of 800 turns is :

(1) 48.8 mH (2) 200 mH (3) 187.5 mH (4) 320 mH

5. In an LCR circuit having L = 8 henry, C = 0.5 μF and R = 100 ohm in series, the resonance frequency in Hz is :

(1) 600 (2) 600π (3) $\frac{250}{\pi}$ (4) 5000

6. A tuning fork produces 8 beats/sec with both, 80 and 70 cm of stretched wire of sonometer. Frequency of the fork is :

(1) 120 Hz (2) 128 Hz (3) 112 Hz (4) 240 Hz

7. A pipe closed at one end produces a fundamental note at 412 Hz. It is cut into two pieces of equal length. The fundamental frequencies produced in the two pieces are :

(1) 206 Hz, 412 Hz (2) 824 Hz, 1648 Hz

(3) 412 Hz, 824 Hz (4) 206 Hz, 824 Hz

8. An α-particle and a proton are accelerated through same potential difference from rest. The ratio of their final velocities is :

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

9. The resistance of a wire of uniform length L and diameter D is R. The resistance of another wire of same material but length $4L$ and diameter $2D$ will be :

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

10. A 10 μF capacitor is charged by a battery of emf 100 V. The energy drawn from the battery and the energy stored in the capacitor, are respectively :

(1) 0.10 J and 0.05 J (2) 0.05 J and 0.10 J

(3) 1.0 mJ and 0.5 mJ (4) 0.05 J and 0.05 J

11. A body is projected vertically up. At certain height h above the ground, it's P. E and K. E are in the ratio 1 : 4. At what height above the ground, P. E and K. E will be in the ratio 4 : 1 ?

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

12. Two bodies have their moments of inertia I and 2I respectively about the axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio :

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

13. The mass of a planet is six times that of the earth. The radius of the planet is twice that of the earth. If the escape velocity from the earth is v, then the escape velocity from the planet is :

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

14. If the earth shrinks such that it's mass does not change but radius decreases to one quarter of it's original value then one complete day will be of :

(1) 96 hrs (2) 48 hrs (3) 6 hrs (4) 1.5 hrs

15. A liquid will not wet the surface of a solid if its angle of contact is :

(1) zero (2) Less than 90°

(3) more than 90° (4) 90°

16. The rest mass of a photon is :

(1) $\frac{h\nu}{c}$ (2) $\frac{h\nu}{c^2}$ (3) $\frac{hc}{\lambda}$ (4) zero

17. For nuclear fission to take place the neutrons must have :

(1) Very very low energy (2) Thermal energy

(3) Very high energy (4) No kinetic energy

18. The half value period of a radioactive nuclide is 3 hours. In 9 hours, it's activity will be reduced to :

(1) $\frac{1}{9}$ (2) $\frac{1}{27}$ (3) $\frac{1}{6}$ (4) $\frac{1}{8}$

19. Digital circuits can be made by repetitive use of :

(1) OR gate (2) AND gate (3) NOT gate (4) NAND gate

20. In a common base transistor amplifier the current gain is :

(1) One (2) More than one

(3) Less than one (4) Infinite

21. The frequency of ultraviolet light is of the order of :

(1) 10^7 Hz (2) 10^{10} Hz (3) 10^{12} Hz (4) 10^{15} Hz

22. In Young's double slit experiment, nth bright fringe of red light ($\lambda_1 = 7500\ \mathring{A}$) coincides with (n + 1)th bright fringe of green light ($\lambda_2 = 6000\ \mathring{A}$). The value of n is :

(1) 4 (2) 5 (3) 3 (4) 2

23. An endoscope is employed to view the internal parts of the body. It is based on th principle of :

(1) Reflection
(2) Refraction
(3) Total internal reflection
(4) Dispersion

24. Focal lengths of objective and eye-piece of a telescope are 200 cm and 4 cm respectively. The length of the telescope in normal adjustment is :

(1) 196 cm (2) 204 cm (3) 250 cm (4) 225 cm

25. Which of the following series of hydrogen spectrum is in the visible region ?

(1) Lymann series
(2) Balmer series
(3) Paschen series
(4) Bracket series

26. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. Then the ratio of their volume is :

(1) 3 : 2 (2) 4 : 9 (3) 9 : 4 (4) 27 : 8

27. A gas undergoes an adiabatic change it's specific heat in the process is :

(1) zero (2) 1 (3) ∞ (4) 0.5

28. At which of the following temperatures would the molecules of a gas have twice the average kinetic energy they have at 27°C ?

(1) 327°C (2) 377°C (3) 397°C (4) 587°C

29. A refrigerator absorbs 2000 cals of heat from ice trays. If coefficient of performance is 4, then work done by the motor is :

(1) 2100 J (2) 4200 J (3) 8400 J (4) 500 J

30. When the displacement is half of the amplitude, then what fraction of the total energy of a simple harmonic oscillator is kinetic ?

(1) $\frac{2}{7}$th (2) $\frac{3}{4}$th (3) $\frac{2}{9}$th (4) $\frac{5}{7}$th

31. If σ is the Stefan's constant and b is the Wien's constant, then the dimensions of σb^4 are :

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

(3) $[M^1L^6T^{-3}]$ (4) $[M^1L^4T^{-3}]$

32. A boy is hanging from a horizontal branch of a tree. The tension in the arms will be maximum when the angle between the arms is :

(1) 0° (2) 60° (3) 90° (4) 120°

33. A body is projected such that it's K.E at the top is $\frac{3}{4}$th of it's initial K. E. What is the angle of projection with horizontal ?

(1) 30° (2) 60° (3) 45° (4) 120°

34. A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of the 12 kg mass is 4 m/s. The kinetic energy of the other mass is :

(1) 288 J (2) 192 J (3) 96 J (4) 144 J

35. The potential energy of a long spring when stretched by 2 cm is u. If the spring is stretched by 8 cm, the potential energy stored in it is :

(1) $\frac{u}{4}$ (2) $4u$ (3) $16u$ (4) $8u$

PART – B

(CHEMISTRY)

36. If ΔH of a reaction is 100 KJ mol^{-1}, then activation energy must be :

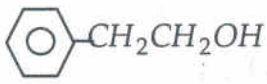
(1) Less than 100 KJ mol^{-1} (2) Greater than 100 KJ mol^{-1}

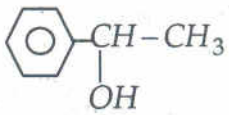
(3) Equal to 100 KJ mol^{-1} (4) None is correct

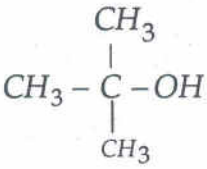
37. A gas expands against a constant external pressure of 2.00 atm, increasing its volume by 3.40 L. Simultaneously, the system absorbs 400 J of heat from its surroundings. What is ΔE, in joules for this gas ?

(1) –689 (2) + 289 (3) –289 (4) + 400

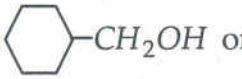
38. Which reacts faster with conc. HCl ?

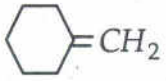
(1) 

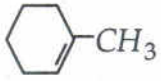
(2) 

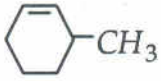
(3) 

(4) $CH_2 = CH - CH_2OH$

39.  on dehydration with conc. H_2SO_4 forms predominantly :

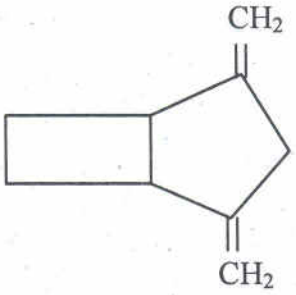
(1) 

(2) 

(3) 

(4) None of these

40. Degree of unsaturation in



is :

(1) 2 (2) 3 (3) 4 (4) 5

41. What is normality of 0.30 M H_3PO_4, (a tribasic acid) in the following reaction ?

$$H_3PO_4 + 2OH^- \rightarrow HPO_4^{2-} + 2H_2O$$

(1) 0.30 N (2) 0.60 N (3) 0.90 N (4) 0.15 N

42. At $25^\circ C$, the vapour pressure of pure methyl alcohol is 92.0 torr. Mole fraction of CH_3OH in a solution in which vapour pressure of CH_3OH is 23.0 torr at $25^\circ C$ is :

(1) 0.25 (2) 0.75 (3) 0.50 (4) 0.66

43. Which has maximum osmotic pressure at temperature T ?

(1) 100 ml of 1 M urea solution

(2) 300 ml of 1 M glucose solution

(3) Mixture of 100 ml of 1 M urea solution and 300 ml of 1M glucose solution

(4) All are isotonic

44. Rate constant of a reaction is 0.0693 min^{-1}, starting with 10 mol, rate of reaction after 10 min is :

(1) 0.693 mol min^{-1} (2) 0.0693×2 mol min^{-1}

(3) 0.0693×5 mol min^{-1} (4) $0.0693 \times (5)^2$ mol min^{-1}

45. Equilibrium constant for the reaction :

$$NH_4OH + H^+ \rightleftharpoons NH_4^+ + H_2O$$

is 1.8×10^9. Hence equilibrium constant for $NH_3(aq) + H_2O \rightleftharpoons NH_4^+ + {}^-OH$ is :

(1) 1.8×10^{-5} (2) 1.8×10^5 (3) 1.8×10^{-9} (4) 5.55×10^{-10}

46. Which of the following is not true for resonance ?

(1) Identical arrangement of atoms (2) Identical bonding

(3) Same no. of paired electron (4) Structure with same energies

47. The geometry of $Ni(CO)_4$ and $Ni(PPh_3)_2\ Cl_2$ are :

(1) Both square planar
(2) Tetrahedral and square planar
(3) Both tetrahedral
(4) Square planar and tetrahedral

48. The paramagnetism of O_2 molecule is believed to be due to the presence of two electrons with parallel spins in :

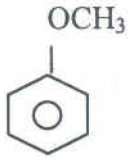
(1) Bonding π orbitals
(2) Antibonding π orbitals
(3) Bonding σ orbitals
(4) Antibonding σ orbitals

49. Trisoxalato aluminate (III) ion is :

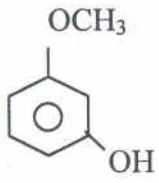
(1) $[Al(C_2O_4)_3]$ (2) $[Al(C_2O_4)_3]^{3+}$ (3) $[Al(C_2O_4)_3]^{2-}$ (4) $Al[(C_2O_4)_3]^{3-}$

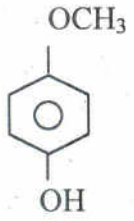
50. $[CrF_6]^{3-}$ has Cr atom ..... hybridized.

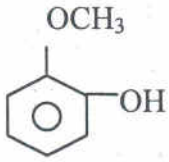
(1) sp^2d^2 (2) d^2sp^3 (3) $d\,sp^2$ (4) sp^3d

51. In  $\xrightarrow{aq\ KOH}$ product

Product is :

(1) 

(2) 

(3) 

(4)  + CH_3OK (mixture)

52. $HC \equiv CH + 2HCHO \xrightarrow{-OCH_3} X$

X is :

(1) $HOH_2C-C\equiv C-CH_2OH$
(2) $HOH_2C-C\equiv C-CH_2OCH_3$
(3) Both are correct
(4) None is correct

53. $H_2C = CH_2 \xrightarrow{h\nu}$ A

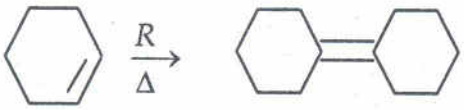
A is :

(1) $H_2C = CH - CH = CH_2$

(2) $H_3C - CH = CH - CH_2$

(3) 

(4) None is correct

54. 

A can be :

(1) Conc. H_2SO_4

(2) alcoholic KOH

(3) Et_3N

(4) t-BuOK

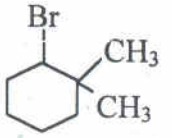
55. Identify the correct statement :

(1) Gypsum is obtained by heating Plaster of Paris

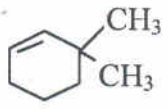
(2) Plaster of Paris can be obtained by hydration of gypsum

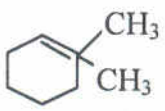
(3) Plaster of Paris contains higher percentage of calcium than does gypsum

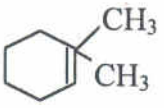
(4) Plaster of Paris is obtained from gypsum by oxidation

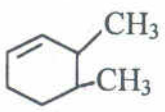
56.  $\xrightarrow[KOH]{alcoholic}$ product

major product is :

(1) 

(2) 

(3) 

(4) 

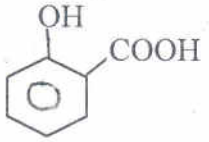
57. Perchloroethane is :

(1) $CH_3CH_2ClO_4$ (2) C_2Cl_6 (3) CH_3-CCl_3 (4) $CCl_3.CHO$

58. $C_3H_6Cl_2$ (A) $\xrightarrow[(iii)\ \Delta]{(i)\ KCN \\ (ii)\ H_3O^+}$ $H_3C-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$ A is :

(1) 1, 1 - dichloropropane (2) 1, 2-dichloropropane

(3) 2, 2 dichloropropane (4) 1, 3-dichloropropane

59. $Y \xleftarrow[Water]{Br_2}$  $\xrightarrow{HNO_3} X$

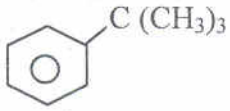
X and Y are :

(1) Picric acid, 2, 4, 6 - tribromophenol

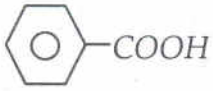
(2) 4-nitrosalicylic acid, 4-bromosalicylic acid

(3) o-nitrophenol, o-bromophenol

(4) None is correct

60. In  $\xrightarrow[\Delta]{KMnO_4}$ product

Product is :

(1)  (2) $(CH_3)_3C-COOH$

(3) Both are correct (4) None is correct

61. For an α-emitting isotope, the value of disintegration constant is 0.49×10^{-10} per year. The amount of the isotope of a given sample will reduce to half its value after a period (in years) of nearly :

(1) 0.45×10^{10} (2) 0.9×10^{10} (3) 1.41×10^{10} (4) 2.82×10^{10}

62. Number of photons of light of wavelength 4000 $\mathring{A}$ required to provide 1.00 J of energy is :

(1) 2.01×10^{18} (2) 12.01×10^{31} (3) 1.35×10^{17} (4) None is correct

63. Vander Waal's equation for one mole of CO_2 gas at low pressure will be :

(1) $\left(P + \frac{a}{V^2}\right) V = RT$ (2) $P(V-b) = RT - \frac{a}{V^2}$

(3) $P = \frac{RT}{V-b}$ (4) $P = \left(\frac{RT}{V-b} - \frac{a}{V^2}\right)$

64. A gas in an open container is heated from $27^\circ C$ to $127^\circ C$, the fraction of the original amount of gas remaining in the container will be :

(1) 3/4 (2) 1/2 (3) 1/4 (4) 1/8

65. The temperature at which a real gas obeys the ideal gas laws over a fairly wide range of pressure is :

(1) Critical temperature (2) Inversion temperature

(3) Boyle's temperature (4) Reduced temperature

66. Atomic wt. of barium is 137.34. The equivalent weight of barium in $BaCrO_4$ used as oxidizing agent in acid medium is :

(1) 137.34 (2) 45.78 (3) 114.45 (4) 68.67

67. The density of 1 M solution of NaCl is 1.0585 g/ml. The molality of the solution is :

(1) 1.0585 (2) 1.00 (3) 0.10 (4) 0.0585

68. The strength of an Oxo acid (E-O-H) where E is the central atom, depends upon the :

(1) Electronegativity of E
(2) Atomic size of E
(3) Ability of E to share electron pair with O
(4) Atomic size and electronegativity of E.

69. $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$ I_2 obtained from 0.1 mole of $CuSO_4$ samp required 100 ml of 1 M hypo, hence mole percentage of pure $CuSO_4$ is :

(1) 100 (2) 50 (3) 25 (4) None is correct

70. The hybridization of carbon atoms in C – C single bond of $HC \equiv C - CH = CH_2$ is :

(1) $sp^3 - sp^3$ (2) $sp - sp^2$ (3) $sp^2 - sp^2$ (4) $sp^3 - sp$

OPTIONAL

PART – C (i)

(MATHEMATICS)

71. If $x = a\cos^3\theta, y = a\sin^3\theta$, then $\frac{dy}{dx}$ is equal to :

(1) cot t (2) cos t (3) tan t (4) – tan t

72. If X, M, Z are denoting Mean, median and mode of a data and $X : M = 9 : 8$, then the ratio M : Z is given by :

(1) 8 : 9 (2) 4 : 3 (3) 7 : 6 (4) 5 : 4

73. Two dice are rolled together, the probability that the total score on the two dice is greater than 10 is given by :

(1) $\frac{1}{4}$ (2) $\frac{1}{6}$ (3) $\frac{1}{12}$ (4) $\frac{5}{6}$

74. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then $A^2 + 2A$ is equal to :

(1) $3A$ (2) $4A$ (3) $2A$ (4) A

75. The value of the determinant

$$\begin{vmatrix} 1 & x & y+z \\ 1 & y & z+x \\ 1 & z & x+y \end{vmatrix}$$ is :

(1) $x+y+z$ (2) 0 (3) 1 (4) $(1+x+y+z)$

76. If $\frac{1}{b+c}, \frac{1}{c+a}$ and $\frac{1}{a+b}$ are in A. P., then a^2, b^2 and c^2 are in :

(1) Geometric Progression (2) Arithmetic Progression

(3) Harmonic Progression (4) None of these

77. The equation of the straight line passing through the point (2, 3) and making intercepts on axes equal in magnitude and sign is :

(1) $x+y=3$ (2) $x-y=5$ (3) $x+y=-5$ (4) $x+y=5$

78. The foci of an ellipse are $(\pm 4, 0)$ and vertices at $(\pm 5, 0)$. Then the equation of the ellipse is :

(1) $\frac{x^2}{25}+\frac{y^2}{9}=1$ (2) $\frac{x^2}{9}+\frac{y^2}{16}=1$

(3) $9x^2+25y^2=1$ (4) None of these

79. The point which divides the line joining the points (2, 4, 5) and (3,5,–4) in the ratio $-2:3$ lies on :

(1) ZOX plane (2) XOY plane (3) YOZ plane (4) None of these

80. The value of $\lim_{x\to 0}\frac{x}{1-\sqrt{1-x}}$ is :

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

81. A random variable X has the following probability distribution values of X :

X :	1	2	3	4	5
P(X) :	k	3k	2k	k	2k

Then the value of $P(X<3)$ is :

(1) $\frac{6}{9}$ (2) $\frac{1}{9}$ (3) $\frac{4}{9}$ (4) $\frac{7}{9}$

82. A unit vector perpendicular to each of the vectors $-6\hat{i}+8\hat{k}$ and $8\hat{i}+6\hat{k}$ forming a right handed system is :

(1) $\hat{j}$ (2) $-\hat{j}$

(3) $\frac{1}{10}(6\hat{i}+8\hat{k})$ (4) $\frac{1}{10}(-6\hat{i}+8\hat{k})$

83. Which of the following is ***not*** associated with any LPP ?

(1) Feasible Solution (2) Optimum Solution

(3) Basic Solution (4) None of these

84. The distance of the plane $2x-3y+6z+14=0$ from the origin is :

(1) 14 (2) 2 (3) –2 (4) 11

85. The direction cosines of the line joining the points (4, 3, – 5) and (–2, 1, – 8) are :

(1) $<2,4,-13>$ (2) $<6,2,3>$ (3) $<\frac{6}{7},\frac{2}{7},\frac{3}{7}>$ (4) None of these

86. Which is not correct ?

(1) Each of the two complex roots of unity is the square of the other.

(2) Sum of the three cube roots of unity is zero.

(3) Product of the three cube roots of unity is one.

(4) None of these

87. If $(1+i)$ is a root of the equation $x^2+ax+2=0$. where $a \in R$, then the value of 'a' is :

(1) –2 (2) 2 (3) 1 (4) –1

88. Solution set of inequality $|3x-2| \le \frac{1}{2}$ is :

(1) $\left[-\frac{1}{2},\frac{1}{2}\right]$ (2) $\left[\frac{1}{2},\frac{5}{6}\right]$ (3) $\left[-\frac{1}{2},\frac{3}{2}\right]$ (4) $\left[\frac{3}{2},\frac{5}{2}\right]$

89. Sum of all the odd divisors of 720 is :

(1) 78 (2) 76 (3) 84 (4) 80

90. The binomial co-efficient of the 4th term in the expansion of $(x-q)^5$ is :

(1) 5 (2) 15 (3) 10 (4) 20

91. Domain of the function $y=\sqrt{4-x^2}$ is :

(1) $R-[0,\ 2]$, where R is the set of real numbers

(2) $[-2, 2]$

(3) $[0, 2]$

(4) $(-\infty, -2) \cup (2, \infty)$

92. Let X be the universal set for sets A and B. If $n(A)=200, n(B)=300$ and $n(A \cap B)=100$, $n(A^c \cap B^c)=300$, then $n(X)$ is equal to :

(1) 500 (2) 600 (3) 700 (4) 400

93. The value of $\tan\left[\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{2}{3}\right)\right]$ is :

(1) $\frac{17}{6}$ (2) $\frac{16}{7}$ (3) $\frac{6}{17}$ (4) None of these

94. If $\sec A+\tan A=\frac{3}{2}$, then :

(1) $\sin A=\frac{12}{13}$ (2) $\sin 2A=\frac{5}{13}$

(3) $\sin A=\frac{5}{13}$ (4) $\sin 2A=\frac{12}{13}$

95. If n is a positive integer, then $2.4^{2n+1}+3^{3n+1}$ is divisible by :

(1) 27 (2) 11

(3) 2 (4) 9

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

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

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

(3) $\frac{\log x}{(1-\log x)}$

(4) $\log x(\log ex)^{-1}$

97. If x be real, the minimum value of $x^2 - 8x + 17$ is :

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

98. The value of $\int \frac{2e^x}{e^{2x}+1} dx$ is equal to :

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

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

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

(4) $\tan^{-1}(2e^x + 1) + c$

99. The area bounded by the curve $y^2 = 4x$ and $x^2 = 4y$ is :

(1) $\frac{16}{3}$ sq. units

(2) $\frac{3}{16}$ sq. units

(3) $\frac{14}{3}$ sq. units

(4) $\frac{3}{14}$ sq. units

100. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is :

(1) $x + y = \frac{x^2}{2} + c$

(2) $xy = \frac{1}{4}x^4 + c$

(3) $x - y = \frac{1}{3}x^3 + c$

(4) $y - x = \frac{1}{4}x^4 + c$

OPTIONAL

PART – C (ii)

(BIOLOGY)

101. Which one of the following taxonomic aids can give comprehensive account of complete compiled information of any one genus or family at a particular time ?

(1) Taxonomic key

(2) Flora

(3) Herbarium

(4) Monograph

102. In five kingdom system, the main basis of classification is :

(1) Structure of cell wall (2) Nutrition

(3) Structure of nucleus (4) Reproduction

103. Who proposed artificial system of classification ?

(1) John Ray (2) Lamarck (3) Linnaeus (4) Wallace

104. Flame cells present in Platyhelminthes, are specialized in :

(1) Respiration and adsorption (2) Respiration and excretion

(3) Osmoregulation and excretion (4) Sosmoregulation and circulation

105. Vexillary aestivation is characteristic of family :

(1) Fabaceae (2) Solanaceae (3) Liliaceae (4) Brassicaceae

106. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein :

(1) Binds with epithelial cells of midgut of the pest ultimately killing it.

(2) Does not kill the carrier bacterium which is itself resistant to this toxin

(3) Is activated by acid pH of the foregut of the insect pest

(4) Is coded by several genes including the cry gene.

107. The common examples of temporary parasites includes :

(1) epiphytes (2) sucker fish

(3) bed bug, leech and mosquito (4) rhizobium

108. The succession taking place on rock is known as ..... .

(1) Hydrach (2) Xerach

(3) Monarch (4) None of the above

109. The term Alpha diversity refers to :

(1) Genetic diversity (2) Species diversity

(3) Ecosystem diversity (4) None of the above

110. Montreal protocol is related to the :

(1) Global warming (2) Ozone layer depletion

(3) Sustainable development (4) Greenhouse gases

111. Primary carboxylation occurs in C3 and C4 plants with the help of :

(1) PEP carboxylase and pyruvate carboxylase

(2) PEP carboxylase and RuBP carboxylasae

(3) RuBP carboxylasae and PEP carboxylase

(4) RuBP carboxylasae and pyruvate carboxylase

112. As compared to anaerobic respiration, the energy gained during aerobic respiration is :

(1) 8 times (2) 12 times (3) 19 times (4) 36 times

113. Fruit and leaf drop at early stages can be prevented by the application of :

(1) Cytokinins (2) Ethylene

(3) Auxins (4) Gibberellic acid

114. The dental formula for humans (as well as apes and some monkeys) is :

(1) 2-1-6-2 (2) 2-1-2-2 (3) 2-1-2-3 (4) 2-2-1-3

115. Total oxygen that can be carried by blood in :

(1) 1000-1200 ml (2) 2000-3000 ml

(3) 200 ml (4) 100 ml

116. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards replication fork.

(2) The leading strand away from replication fork.

(3) The lagging strand away from the replication fork.

(4) The leading strand towards replication fork.

117. Infection of Ascaris occurs due to :

(1) Contaminated food and water (2) Mosquito bite

(3) Tse-tse fly (4) Sand fly

118. Name the process by which the nutritional quality of food crops is improved through biological means such as conventional plant breeding.

(1) Hybridization (2) Nutrification

(3) Bioaccumulation (4) Biofortification

119. In which of the following year the Yamuna Action Plan (YAP) was implemented ?

(1) 1987 (2) 1991 (3) 1993 (4) 1999

120. To remove negatively charged molecules through matrix of agarose, nucleic acid molecules are separated by applying :

(1) Electrical field (2) Electric current

(3) Magnetic field (4) UV radiation

121. Which of the following is developed by parthenogenesis ?

(1) Drones (2) Queen honey bee

(3) Worker honey bee (4) Both (2) and (3)

122. Apomixis is a type of reproduction that results in the development of a/an :

(1) New organism without fusion of gametes.

(2) New organisms from fusion products of gametes

(3) Embryo from endosperm

(4) Embryo from nucleus

123. Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy ?

(1) Six weeks (2) Eight weeks (3) Twelve weeks (4) Eighteen weeks

124. Conditions of a karyotype $2n \pm 1$ and $2n \pm 2$ are called :

(1) Aneuploidy (2) Polyploidy

(3) Klinfelter's & Turner's syndrome (4) Monosomy

125. The clouds of cosmic dust and gases from which the entire solar system is believed to be formed by condensation, is called :

(1) Ylem (2) Whey (3) Cosmos (4) Galaxy

126. Vessels and fibers occurs in :

(1) Xylem of angiosperms (2) Xylem of gymnosperms

(3) Xylem of pteridophytes (4) All of the above

127. Tendon and ligament are examples of :

(1) Loose connective tissues (2) Special connective tissues

(3) Dense irregular connective tissues (4) Dense regular connective tissues

128. Prokaryotic genetic system has :

(1) DNA but no histones (2) Both DNA and histones

(3) Neither DNA nor histones (4) Either DNA or histone

129. In order to enter the cell cycle of cell must be stimulated from outside. What type of molecule provides this stimulation ?

(1) Cyclins (2) Cyclins-dependent kinases

(3) Cytokines and growth factors (4) Tyrosine

130. The absorption of minerals due to difference in the electro potential gradient without use of energy is :

(1) Active absorption (2) Passive absorption

(3) Osmotic absorption (4) None of the above

ANSWER KEY

	A	B	C	D
1) Q1	4	4	4	1
2) Q2	4	2	1	1
3) Q3	1	4	3	1
4) Q4	1	4	2	4
5) Q5	3	3	2	3
6) Q6	1	4	1	1
7) Q7	3	1	1	2
8) Q8	1	3	1	3
9) Q9	4	2	4	2
10) Q10	3	2	3	1
11) Q11	4	1	1	1
12) Q12	1	1	2	3
13) Q13	1	1	3	1
14) Q14	1	4	2	4
15) Q15	2	3	1	3
16) Q16	1	4	1	4
17) Q17	2	1	3	2
18) Q18	3	1	1	4
19) Q19	2	1	4	4
20) Q20	1	2	3	3
21) Q21	1	1	4	4
22) Q22	1	3	4	1
23) Q23	1	1	1	3
24) Q24	4	4	1	2
25) Q25	3	3	3	2
26) Q26	4	4	4	4
27) Q27	1	4	2	1
28) Q28	3	1	4	1
29) Q29	2	1	4	1
30) Q30	2	3	3	2
31) Q31	4	1	4	4
32) Q32	2	2	1	4
33) Q33	4	3	1	1
34) Q34	4	2	1	1
35) Q35	3	1	2	3
36) Q36	2	1	3	2
37) Q37	2	1	2	3
38) Q38	4	3	3	2
39) Q39	1	1	1	2
40) Q40	2	3	2	3
41) Q41	2	3	2	2
42) Q42	2	2	3	1
43) Q43	2	3	2	4
44) Q44	4	1	2	1
45) Q45	2	2	3	1
46) Q46	3	2	2	2

47) Q47	1	3	1	2
48) Q48	1	2	4	2
49) Q49	1	2	1	4
50) Q50	3	3	1	2
51) Q51	2	3	2	1
52) Q52	1	1	2	1
53) Q53	4	1	2	3
54) Q54	1	1	4	1
55) Q55	1	3	2	3
56) Q56	2	2	2	3
57) Q57	3	2	2	2
58) Q58	2	2	4	3
59) Q59	2	4	1	1
60) Q60	3	2	2	2
61) Q61	3	2	1	3
62) Q62	2	2	1	1
63) Q63	3	4	3	1
64) Q64	1	1	1	1
65) Q65	2	2	3	3
66) Q66	1	2	3	2
67) Q67	1	1	1	2
68) Q68	3	4	1	4
69) Q69	1	1	1	1
70) Q70	3	1	3	2
71) Q71	2	3	1	4
72) Q72	3	1	3	2
73) Q73	1	4	2	3
74) Q74	3	2	1	1
75) Q75	4	3	2	2
76) Q76	4	1	4	2
77) Q77	1	3	2	4
78) Q78	2	2	3	1
79) Q79	1	1	1	3
80) Q80	3	2	2	2
81) Q81	2	2	4	3
82) Q82	4	3	1	1
83) Q83	1	1	2	4
84) Q84	3	3	1	2
85) Q85	2	4	3	3
86) Q86	4	2	2	4
87) Q87	2	4	3	1
88) Q88	3	1	1	2
89) Q89	1	3	3	1
90) Q90	2	2	4	3
91) Q91	1	4	3	2
92) Q92	3	1	1	3
93) Q93	2	2	4	1

94) Q94	1	1	2	3
95) Q95	2	3	3	4
96) Q96	3	4	2	1
97) Q97	1	2	4	3
98) Q98	4	3	1	2
99) Q99	2	1	3	1
100) Q100	3	2	2	2
101) Q101	1	3	1	4
102) Q102	1	3	4	2
103) Q103	3	3	1	3
104) Q104	1	3	3	3
105) Q105	1	1	2	1
106) Q106	3	1	4	1
107) Q107	1	4	2	3
108) Q108	4	1	3	2
109) Q109	3	3	3	3
110) Q110	2	2	1	2
111) Q111	1	1	3	3
112) Q112	3	1	1	3
113) Q113	2	3	4	3
114) Q114	3	1	3	3
115) Q115	2	1	2	1
116) Q116	4	1	1	3
117) Q117	2	3	1	1
118) Q118	3	2	3	4
119) Q119	3	3	1	3
120) Q120	1	2	1	2
121) Q121	1	3	3	1
122) Q122	4	1	3	1
123) Q123	1	4	3	3
124) Q124	3	3	3	1
125) Q125	2	2	1	1
126) Q126	3	4	1	1
127) Q127	3	2	3	4
128) Q128	3	3	2	1
129) Q129	3	3	3	3
130) Q130	1	1	2	2