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Please Copy The Following Things Correctly On The OMR Sheet And Blacken The Corresponding Circles.

020363

Booklet Series C

Booklet No.....

Subject Code : 01 (For Mathematics)

OMR Sheet No.....

02 (For Biology)

ENTRANCE EXAMINATION - 2018

Name of the candidate :

Roll No.....Name of the Centre.....

Signature of the Candidate :.....

Signature of the Invigilator:.....

Instruction to the Candidates:

1. There are 200 questions in all, out of which 50 questions are on Mental Aptitude, 50 questions are on Physics, 50 questions are on Chemistry and 50 questions are on Mathematics / Biology.
2. Questions in **Mental Aptitude, Physics and Chemistry** are compulsory for all. Out of **Mathematics** and **Biology** Sections, you are requested to answer any one.

Duration of the Test : Two hours

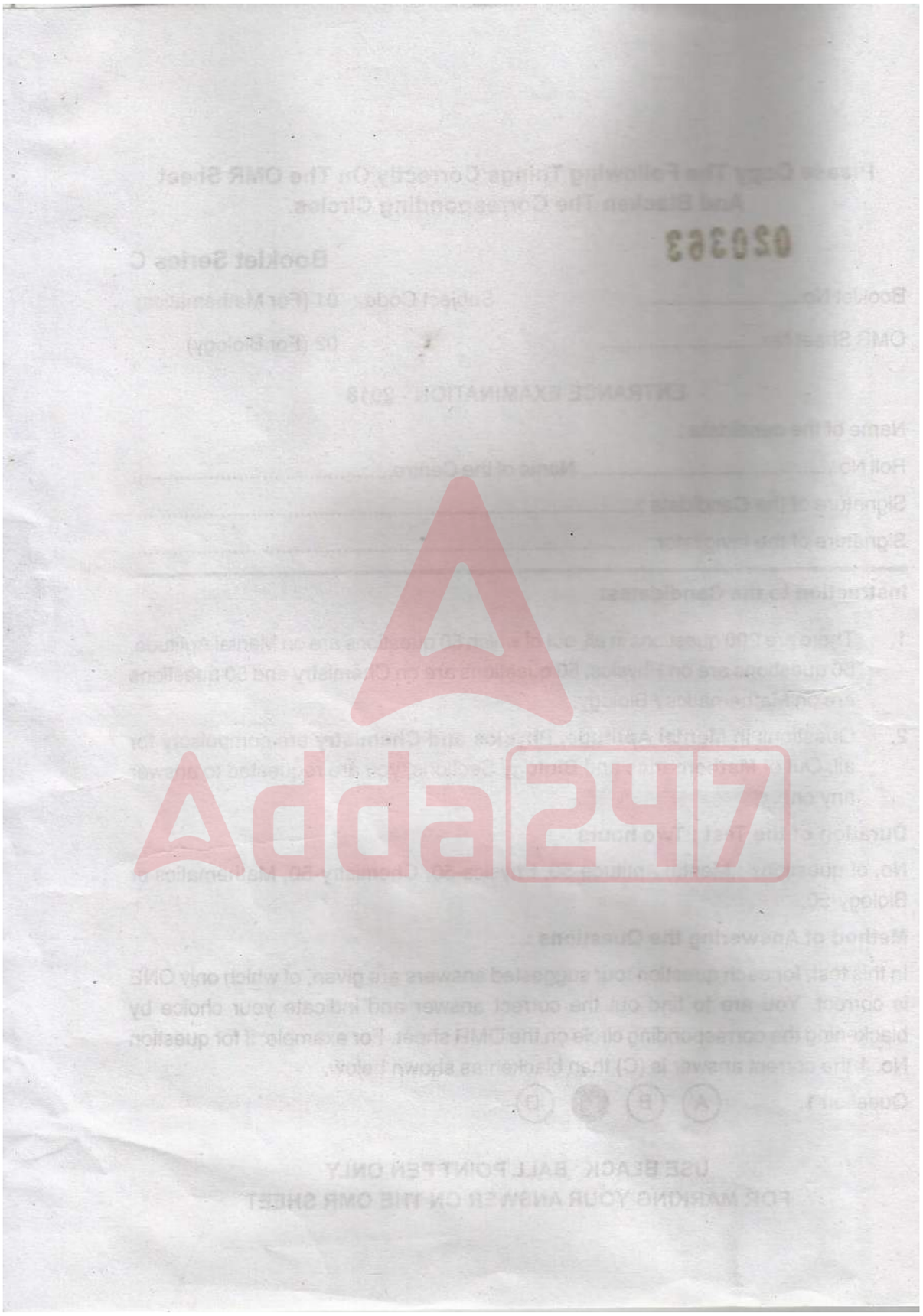
No. of questions : Mental Aptitude-50, Physics-50, Chemistry-50, Mathematics or Biology-50.

Method of Answering the Questions :

In this test, for each question four suggested answers are given, of which only ONE is correct. You are to find out the correct answer and indicate your choice by blackening the corresponding circle on the OMR sheet. For example, if for question No. 1 the correct answer is (C) then blacken as shown below.

Question 1. (A) (B) ● (D)

USE BLACK BALL POINT PEN ONLY
FOR MARKING YOUR ANSWER ON THE OMR SHEET



MENTAL APTITUDE
Questions : 50

Direction for questions 1 - 5 :

Read the following information to answer the given questions.

i) There is a group of five persons A, B, C, D and E.

ii) One of them is a horticulturist, one is a physicist, one is a journalist, one is an industrialist and one is an advocate.

iii) Three of them – A, C and advocate prefer tea to coffee and two of them – B and the journalist prefer coffee to tea.

iv) The industrialist and D and A are friend of one another but two of these prefer coffee to tea.

v) The horticulturist is C's brother.

Questions :

1. Who is a horticulturist ?
   (A) A (B) B (C) C (D) E

2. Who is an industrialist ?
   (A) E (B) C (C) B (D) D

3. Which of the following groups includes a person who likes tea but is not an advocate ?
   (A) ACE (B) DE (C) BD (D) BCD

4. Who is a physicist ?
   (A) A (B) C (C) D (D) E

5. Which of the statements above is superfluous in order to answer the above questions ?
   (A) Nil (B) (iii) (C) (ii) (D) (v)

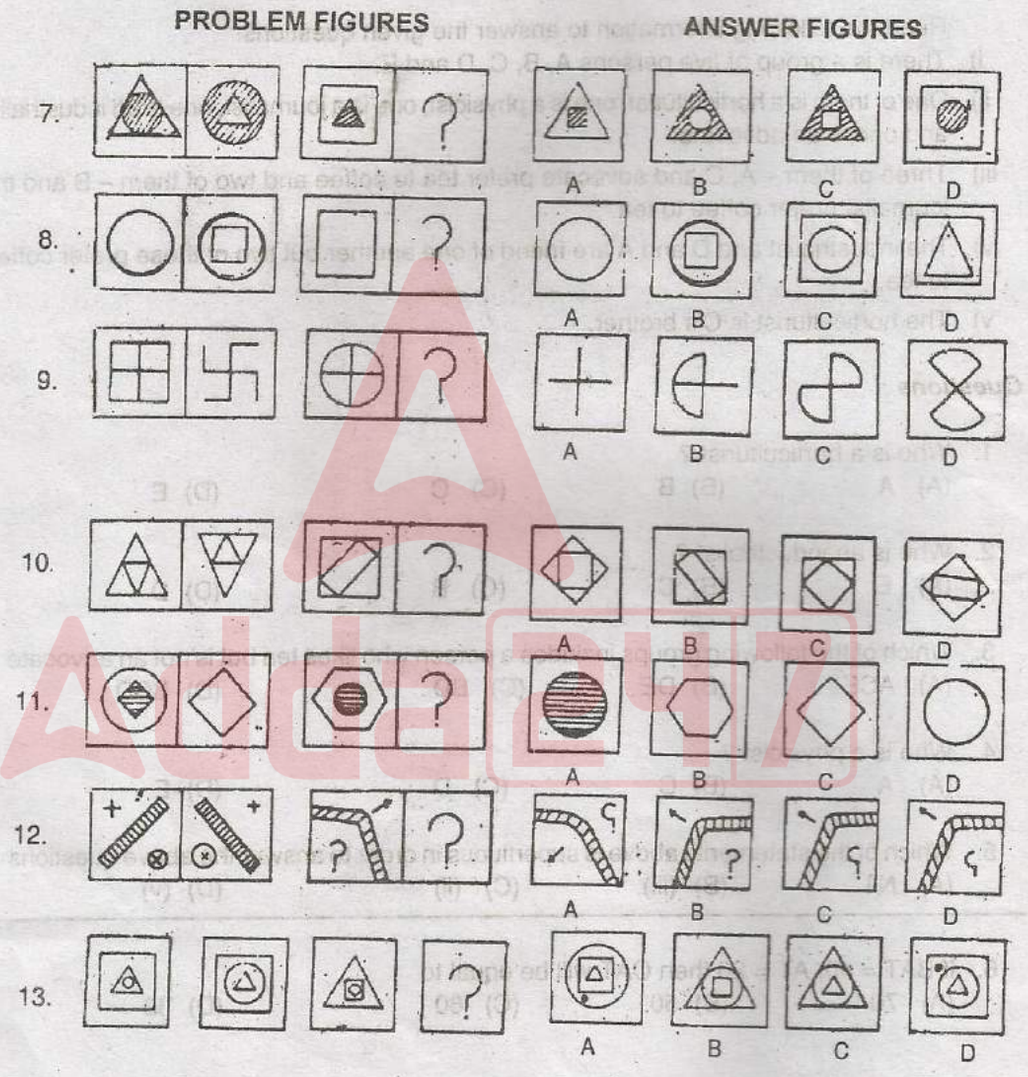
---

6. If BAT = 40, AT = 20 then CAT will be equal to
   (A) 70 (B) 50 (C) 60 (D) 30

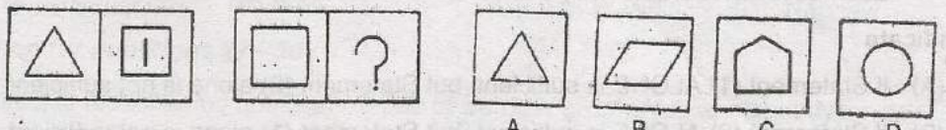
Direction for questions 7 – 16:

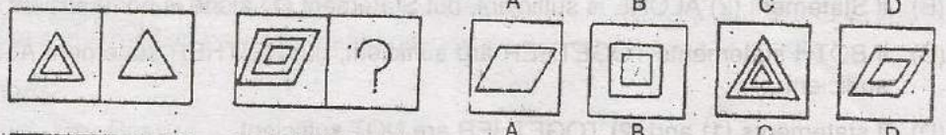
In the problem Figures, the first two figures bear a definite relationship with each other, and the third figure bears the same relation with one of the four figures given as Answer Figures, marked (A), (B), (C) and (D). Indicate the correct answer.

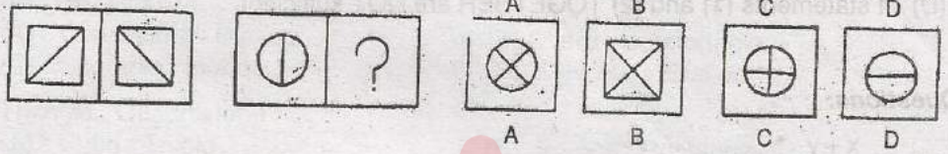
Questions:



PROBLEM FIGURES ANSWER FIGURES

14. 

15. 

16. 

17. If + means ÷, × means -, ÷ means × and - means +, then
$8 + 6 \times 4 \div 3 - 4 = ?$
(A) - 12 (B) - 20/3 (C) 12 (D) 20/3

Direction for questions 18 - 20 :

In each of the following questions, four groups of letters are given; three of them are alike in a certain way while one is different. Choose the ODD one.

Questions :

18. (A) FIL (B) RUX (C) ILO (D) LOQ

19. (A) AZBY (B) PTQS (C) CWDV (D) GQHR

20. (A) NEXFL (B) LANCP (C) FRGSP (D) ZGPKU

21. In a row of 60, A is standing at 10th from the right end, how many places should A move left ward to become 23rd from the left end?
(A) 25 (B) 26 (C) 27 (D) 28

Direction for questions 22 – 25:

Each question is followed by two statements (1) and (2).

Indicate

(A) if Statement (1) ALONE is sufficient, but Statement (2) alone is not sufficient

(B) if Statement (2) ALONE is sufficient, but Statement (1) alone is not sufficient

(C) if BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient

(D) if statements (1) and (2) TOGETHER are NOT sufficient

Questions:

22. If $\frac{x+y}{z} > 0$, is $x < 0$?

(1) $x < y$

(2) $z < 0$

23. If p is the perimeter of rectangle Q, what is the value of p ?

(1) Each diagonal of rectangle Q has length 10.

(2) The area of rectangle Q is 48.

24. In a school, 300 students study Hindi or Urdu or both. If 100 of these students do not study Hindi, how many of these students study both Hindi and Urdu ?

(1) Of the 300 students, 200 study Hindi or both languages.

(2) A total of 240 of the students study Urdu.

25. If m is an integer, is m odd ?

(1) $\frac{m}{2}$ is NOT an even integer.

(2) $m - 3$ is an even integer.

26. Pointing to a photograph, a woman says, "This man's son's sister is my mother-in-law". How is the woman's husband related to the man in the photograph ?
(A) Grandson (B) Son (C) Son-in-law (D) Nephew

Direction for questions 27 - 30 :

In each of the following questions, a pair of words is given. You are to study the relation existing between them and then find out from the given alternatives, the pair of words that bears the same relation between them and indicate that on the answer sheet.

Questions :

27. Fatigue : Resting
(A) Overweight : Dieting (B) Ward : Comfortable
(C) Sporadic : Infrequent (D) Elevated : Exalted

28. Triangle : Quadrilateral
(A) Cube : Trifold (B) Square : Rectangle
(C) Trident : Trapezium (D) Pentagon : Hexagon

29. Numismatist : Coins
(A) Philatelist : Stamps (B) Jeweller : Jewels
(C) Cartographer : Maps (D) Geneticist : Chromosomes

30. Textile : Mill
(A) Eggs : Hen (B) Coal : Mine (C) Food : Agriculture (D) Brick : Kiln

---

31. Rahim moves 20 metres in East direction and then turns to his left and then moves 15 metres and then he turns to his right and moves 25 metres. After this he turns to his right and moves 15 metres. Now how far is he from his starting point?
(A) 0 metre (B) 40 metres (C) 45 metres (D) 50 metres

Direction for questions 32 - 34 :

The numbers in each series proceed according to a certain rule. Your task is to find out the rule according to which the numbers are arranged and find out the number which can fill in the LAST blank with the '?' mark from among the suggested answers.

Questions:

32. 301 291 282 274 ?
(A) 265 (B) 268 (C) 270 (D) 267

33. 3 2 9 4 81 16 6561 ?
(A) 64 (B) 243 (C) 256 (D) None of these

34. 4 6 10 18 34 66 ?
(A) 100 (B) 130 (C) 88 (D) 99

35. If the first day of the year (other than the leap year) was Friday, then which will be the last day of that year ?
(A) Monday (B) Friday (C) Saturday (D) Sunday

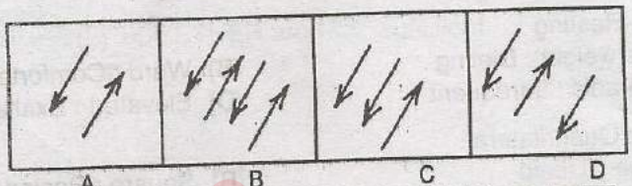
Direction for questions 36 – 45:

In each of the following questions there are figures. Three of them are similar in some respect while one is different. Select the figure which is DIFFERENT.

Questions:

PROBLEM FIGURES

36.



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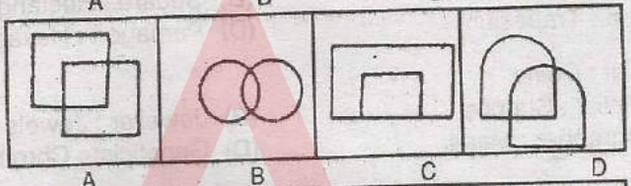

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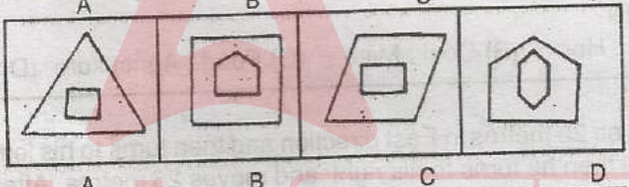

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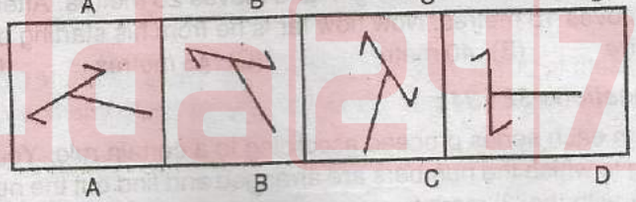

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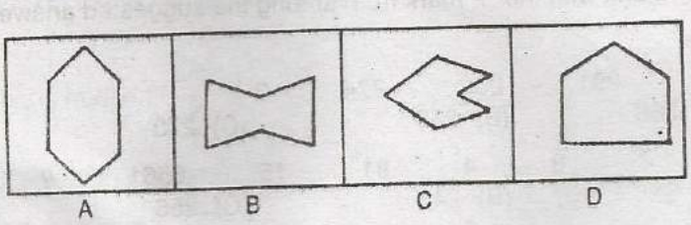
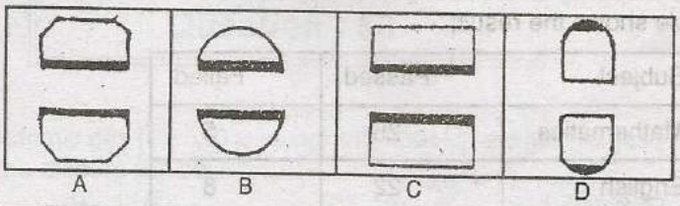


PROBLEM FIGURES

41.



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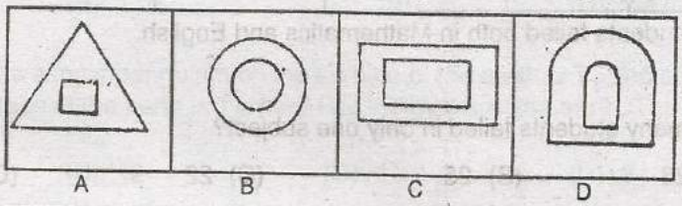

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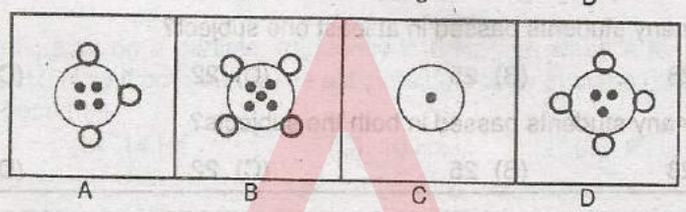

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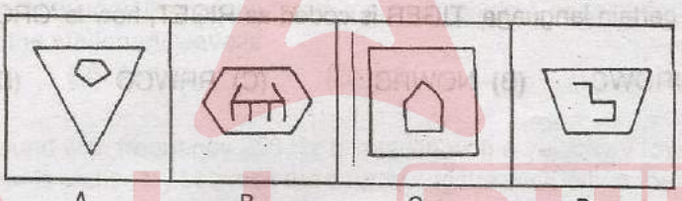

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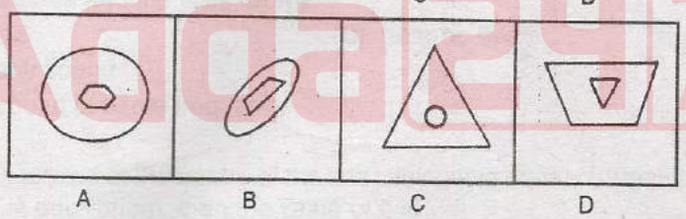


46. If 'man' is called 'girl', 'girl' is called 'boy', 'boy' is called 'lady', 'lady' is called 'butler' and 'butler' is called 'player', who will serve in restaurant?

(A) Player (B) Butler (C) Boy (D) Lady

Direction for questions 47 – 49 :

All the 30 students of a class took a test on Mathematics and a test on English. The following table shows the result:

Subject	Passed	Failed
Mathematics	25	5
English	22	8

Two students failed both in Mathematics and English.

Questions:

47. How many students failed in only one subject?

(A) 28 (B) 25 (C) 22 (D) 9

48. How many students passed in at least one subject?

(A) 28 (B) 25 (C) 22 (D) 9

49. How many students passed in both the subjects?

(A) 28 (B) 25 (C) 22 (D) 19

50. If in a certain language, TIGER is coded as RIGET, how is 'CROWN' coded in that code?

(A) NROWC (B) NOWRC (C) RRWCO (D) NOWCR

PHYSICS
Question : 50

51. 3 mol of a monatomic gas ($\nu = 5/3$) is mixed with 1 mol of a diatomic gas ($\nu = 7/3$) The value of ν for the mixture will be
(A) 9/11 (B) 11/7 (C) 12/7 (D) 15/7

52. Time period of a simple pendulum on the surface of the earth is T_1 and at a height R above the surface of the earth is T_2, here R is the radius of the earth. The ratio T_1/T_2 is
(A) 1 (B) $\sqrt{2}$ (C) 4 (D) 2

53. When a force F_1 acts on a particle, frequency is 6 Hz and when a force F_2 acts, frequency is 8 Hz. Now if both the forces act simultaneously in same direction, then its frequency becomes
(A) 20 Hz (B) 14 Hz (C) 10 Hz (D) 2 Hz

54. When a fundamental tone is produced from a pipe of length l, open at both ends, the wavelength of the stationary wave is
(A) l (B) $2l$ (C) $l/2$ (D) $4l$

55. A source of sound with frequency 256 Hz is moving with a velocity v towards a wall and an observer is stationary between the source and the wall. When the observer is between the source and the wall, he will
(A) hear beats (B) hear no beats
(C) not get any sound
(D) get the sound of same frequency

56. If a charge q is placed at the centre of the line joining two equal charges Q such that the system is in equilibrium, then the value of q is
(A) Q/2 (B) –Q/2 (C) –Q/4 (D) Q/4

57. If a linear isotropic dielectric is placed in an electric field of strength E, then the polarisation P is
(A) independent of E (B) inversely proportional to E
(C) directly proportional to $\sqrt{E}$ (D) directly proportional to E

58. Three resistances P, Q, R each of 2 Ω and an unknown resistance S form the four arms of a Wheatstone's bridge circuit. When a resistance of 6 Ω is connected in parallel to S the bridge gets balanced. What is the value of S?
(A) 2 Ω (B) 3 Ω (C) 6 Ω (D) 1 Ω

59. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be
(A) one fourth (B) halved (C) doubled (D) four times

60. An electric bulb marked as 50 W-200 V is connected across a 100 V supply. The present power of the bulb is
(A) 37.5 W (B) 25 W (C) 12.5 W (D) 10 W

61. A circular coil carrying a certain current produces a magnetic field B_0 at its centre. The coil is now rewound so as to have 3 turns and the same current is passed through it. The new magnetic field at the centre is
(A) $B_0/9$ (B) $9B_0$ (C) $B_0/3$ (D) $3B_0$

62. A straight wire of length 2 m carries a current of 10 A. If this wire is placed in a uniform magnetic field of 0.15 T making an angle of 45^0 with the magnetic field, the applied force on the wire will be
(A) 1.5 N (B) $3\sqrt{2}$ N (C) 3 N (D) $3/\sqrt{2}$ N

63. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show
(A) anti-ferromagnetism (B) paramagnetism
(C) diamagnetism (D) no magnetic property

64. The rate of change of current of 10 A s^{-1} in a coil produces an emf of 5 V. Then the self-inductance of the coil in henry is
(A) 0.5 (B) 0.25 (C) 1.0 (D) 1.25

65. The phase difference between the alternating current and emf is $\pi/2$. Which of the following CANNOT be the constituent of the circuit?
(A) L, C (B) L alone (C) C alone (D) R, L

66. An electric motor operating on 15 V supply draws a current of 5 A and yields mechanical power of 60 W. The energy lost as heat in one hour (in kJ) is
(A) 0.54 (B) 5.4 (C) 54 (D) 540

67. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to
(A) the speed of light in vacuum (B) reciprocal of speed of light in vacuum
(C) the ratio of magnetic permeability to the electric susceptibility of vacuum
(D) unity

68. The ratio of the speed of an object to the speed of its real image of magnification m in the case of a convex mirror is
(A) $-1/m^2$ (B) m^2 (C) $-m$ (D) $1/m$

69. An air bubble is contained inside water. It behaves as a
(A) concave lens (B) convex lens
(C) neither concave nor convex (D) None of these

70. An eye specialist prescribes spectacles having a combination of a convex lens of focal length 40 cm in contact with a concave lens of focal length 25 cm. The power of this lens combination will be
(A) +1.5 D (B) -1.5 D (C) +6.67 D (D) -6.67 D

71. Two monochromatic light waves of amplitudes A and 2A interfering at a point have a phase difference of 60^0. The intensity at that point will be proportional to
(A) $3\ A^2$ (B) $5\ A^2$ (C) $7\ A^2$ (D) $9\ A^2$

72. Photoelectric emission occurs only when the incident light has more than a certain minimum
(A) power (B) wavelength (C) intensity (D) frequency

73. If the kinetic energy of a free electron doubles, its de Broglie wavelength changes by the factor
(A) $1/\sqrt{2}$ (B) $\sqrt{2}$ (C) $1/2$ (D) 2

74. The decimal equivalent of the binary number $(1\ 1\ 0\ 1\ 0.\ 1\ 0\ 1)_2$ is
(A) 9.625 (B) 25.265 (C) 26.625 (D) 26.265

75. Application of a forward bias to a p-n junction
(A) widens the depletion zone
(B) increases the potential difference across the depletion zone
(C) increases the number of donors on the n-side
(D) increases the electric field in the depletion zone

76. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are
(A) $FV^{-1}T^{-1}$ (B) FVT^{-1} (C) $FV^{-1}T$ (D) FVT^{-2}

77. If the error in measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be
(A) 2% (B) 4% (C) 6% (D) 8%

78. A particle is travelling along a straight line OX. The distance x(in meters) of the particle from O at a time t is given by $x = 37 + 27t\text{-}t^3$, where t is in seconds. The distance of the particle from O when it comes to rest is
(A) 81 m (B) 91 m (C) 101 m (D) 111 m

79. Value of ratio between cross product and dot product of two vectors is $1/\sqrt{3}$. The angle between two vectors is
(A) 30^0 (B) 45^0 (C) 60^0 (D) 120^0

80. A body of mass M hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is
(A) MV (B) 1.5 MV (C) 2 MV (D) Zero

81. For an object sliding on a plane, the force of friction is less if the plane is inclined, instead of being horizontal
(A) because, effective mass decreases (B) because, normal force decreases
(C) because, co-efficient of friction decreases
(D) for an angle of inclination θ, friction is inversely proportional to $\tan\theta$

82. If a body travels along a circular path with uniform speed then its acceleration
(A) is zero (B) acts along its circumference
(C) acts along its tangent (D) acts along its radius

83. A force is acting on a mass of 6 kg. Displacement x of the mass is related with time t as $x = t^2/4$ meter. Work done by the force in 2 sec. is
(A) 3 J (B) 6 J (C) 9 J (D) 12 J

84. A particle is projected from the ground with kinetic energy E at an angle of 60^0 with the horizontal. Its kinetic energy at the highest point of its motion will be
(A) $E/\sqrt{2}$ (B) E/2 (C) E/4 (D) E/8

85. Power required to raise a mass of 120 kg vertically upwards at a velocity of 4.5 $m.s^{-1}$ is
(A) 5 kW (B) 5.3 kW (C) 8 kW (D) 11.2 kW

86. A body falling vertically downwards under gravity breaks in two parts of unequal masses. The centre of mass of the two parts taken together shifts horizontally towards
(A) lighter piece (B) heavier piece
(C) depends on the vertical velocity at the time of breaking
(D) does not shift horizontally

87. Angular momentum of a moving body remains constant if
(A) a pressure acts on the body (B) an external force acts on the body
(C) an external torque acts on the body (D) no external torque acts on the body

88. Moment of inertia of circular wire of mass m and radius r about its diameter is
(A) ½ mr^2 (B) ¼ mr^2 (C) mr^2 (D) $2mr^2$

89. If the diurnal motion of the earth ceases all on a sudden, then the value of the acceleration due to gravity of a body at the equator will
(A) remains same (B) be zero
(C) increase (D) decrease

90. Two satellites of masses m_1 and m_2 ($m_1 > m_2$) are revolving around the earth in orbits of radii r_1 and r_2 ($r_1 > r_2$) with velocities v_1 and v_2 respectively. In this case
(A) $v_1 = v_2$ (B) $v_1 < v_2$ (C) $v_1 > v_2$ (D) $v_1/r_1 = v_2/r_2$

91. A wire of initial length L and area of cross-section A has Young's modulus Y of its material. The wire is stretched by a stress S within its elastic limit. The stored energy density in the wire will be
(A) $S/2Y$ (B) $2Y/S^2$ (C) $S^2/2Y$ (D) S^2/Y

92. Which of the following works on Pascal's law?
(A) Sprayer (B) Hydraulic lift (C) Barometer (D) Venturimeter

93. Surface energy of a water drop of radius r will be directly proportional to
(A) r (B) r^2 (C) r^3 (D) $1/r$

94. A spherical ball is falling with a uniform velocity v through a viscous medium of coefficient of viscosity η. If the viscous force acting on the spherical ball is F then
(A) $F \alpha \eta$ and $F \alpha 1/v$
(B) $F \alpha \eta$ and $F \alpha v$
(C) $F \alpha 1/\eta$ and $F \alpha 1/v$
(D) $F \alpha 1/\eta$ and $F \alpha v$

95. Apparent weight of a body immersed in water at 20^0C is W_1. When temperature is increased to 40^0C, the apparent weight becomes W_2. In this case
(A) for different solids W_2 may be greater than or less than W_1
(B) W_2 is always equal to W_1
(C) W_2 is always less than W_1
(D) W_2 is always greater than W_1

96. An ideal gas is expanding such that pT^2 = constant. The coefficient of volume expansion of the gas is
(A) 1/T (B) 2/T (C) 3/T (D) 4/T

97. During boiling water at 100^0C, what will be its specific heat?
(A) zero (B) 0.5 (C) 1 (D) Infinite

98. If the temperature of a black body raises from T to 2T, how many times will its rate of radiation be?
(A) 16 (B) 8 (C) 4 (D) 2

99. In a given process of an ideal gas , $dW = 0$ and $dQ < 0$. Then for the gas
(A) the temperature will decrease
(B) the volume will increase
(C) the pressure will remain constant
(D) the temperature will increase

100. Even Carnot engine CANNOT give 100% efficiency, because we CANNOT
(A) eliminate friction
(B) prevent radiation
(C) reach absolute zero temperature
(D) find ideal sources

CHEMISTRY
Question : 50

101. Incomplete combustion of gasoline produces
(A) CO_2 (B) CO (C) SO_2. (D) NO_2

102. Cause of byssinosis diseases
(A) fly-ash (B) cement particles (C) cotton fibre (D) lead particles

103. Which one is NOT favourable for S_N1 reaction
(A) Polar solvent (B) Strong nucleophile
(C) Low concentration (D) 3^0 alkyl halide

104. Consider the following reaction:

$$\text{Phenol} \xrightarrow[\text{distillation}]{\text{Zn dust}} X \xrightarrow[\text{anhy. } AlCl_3]{CH_3Cl} Y \xrightarrow[(ii)\ H_3O^{\oplus}]{(i)\ \textit{Alkaline } KMnO_4} Z$$

The product Z is
(A) Benzaldehyde (B) Benzene
(C) Benzoic acid (D) Toluene

105. Which converts carboxylic acids directly into alcohols
(A) $LiAlH_4$ (B) $Na + C_2H_5OH$ (C) $NaBH_4$ (D) All of these

106. In the reaction of acetaldehyde with aniline, the product formed is
(A) Schiff's base (B) Carbylamine
(C) Imine (D) None of these

107. Complete hydrolysis of cellulose yields
(A) D-fructose (B) D-ribose (C) D-glucose (D) L-glucose

108. Monomers of Buna-S are
(A) Styrene and Butadiene (B) Butadiene
(C) Isoprene and Butadiene (D) Vinyl chloride and Sulphur

109. Chemical name of aspirin is
(A) Methyl Benzoate (B) Ethyl Salicylate
(C) Acetylsalicylic acid (D) Hydroxybenzoic acid

110. Which of the following crystal systems does NOT have body-centered lattice?
(A) Orthorhombic (B) Tetragonal (C) Monoclinic (D) Cubic

111. NaCl has face-centered unit cell. In its crystal, the number of Cl^- ions present in contact with a Na^+ ion is
(A) 4 (B) 6 (C) 8 (D) 10

112. Which of the following concentration units does NOT depend on temperature?
(A) Molarity (B) Normality (C) Mole fraction (D) Formality

113. At a given temperature, which one of the following solutions would have the highest vapour pressure?
(A) 0.1 m glucose solution (B) 0.1 m NaCl solution
(C) 0.1 m $CaCl_2$ solution (D) 0.1 m $Al_2(SO_4)_3$ solution

114. Which one of the following does NOT give precipitate on reaction with lead acetate?
(A) HI (B) HBr (C) HCl (D) HF

115. At 250^0C, the correct order of molar ionic conductances of the ions H^+, Li^+, Na^+ and K^+ in infinite dilute aqueous solution is
(A) $H^+ < Li^+ < Na^+ < K^+$ (B) $K^+ < Na^+ < Li^+ < H^+$
(C) $Li^+ < Na^+ < K^+ < H^+$ (D) $Li^+ < K^+ < H^+ < Na^+$

116. The activation energy of a reaction depends on
(A) temperature
(B) initial concentration of the reactant
(C) effective collisions among the reactant molecules
(D) nature of the reactants

117. The bottle of liquor ammonia is cooled before opening the cork because it
(A) is a mild explosive (B) is a corrosive liquid
(C) is harmful to lung (D) exerts high vapour pressure

118. Which of the following substances form a colloidal solution in water?
(A) Glucose (B) Urea (C) $BaSO_4$ (D) Starch

119. Adsorption of a gas on a solid surface is an exothermic process, because
(A) change in free energy of the system increases
(B) enthalpy of the system increases
(C) entropy of the system increases
(D) enthalpy of the system decreases

120. In the manufacture of steel, the process in which O_2 is used instead of air is
(A) Open-hearth process (B) Acidic Bessemer's process
(C) Alkaline Bessemer's process (D) LD process

121. The ore that does NOT contain aluminium is
(A) Fluorspar (B) Feldspar (C) Cryolite (D) Mica

122. Which of the following nitrogen oxides is ionic ?
(A) Nitrogen trioxide (B) Nitrogen pentoxide
(C) Dinitrogen tetroxide (D) Nitric oxide

123. Which one of the following is used as the photosensitive substance in Xerox machines
(A) Hg (B) Black P (C) Se (D) Te

124. Fe^{2+} can be differentiated from Fe^{3+} with the help of
(A) $BaCl_2$ (B) $AgNO_3$ (C) NH_4SCN (D) None of these

125. The salt of the d-block element that is used as a catalyst in the dissociation of the bleaching powder is
(A) Ni (B) CO (C) V (D) Cr

126. The reagent used for identifying Nickel ion is
(A) Potassium ferrocyanide (B) Phenolphthalein
(C) Dimethylglyoxime (D) EDTA

127. When 800 g of a 40% solution by weight was cooled, 100 g of solute was precipitated. The percentage composition of the remaining solution is
(A) 20.0% (B) 25.0% (C) 31.4% (D) 50.0%

128. A sample of $Na_2CO_3.H_2O$ weighing 0.62 g is added to 100 ml of 0.1N H_2SO_4. The resulting solution will be
(A) Basic (B) Neutral (C) Acidic (D) Amphoteric

129. An anion X^{3-} has 36 electrons and 45 neutrons. What is the mass number of the element X?
(A) 81 (B) 84 (C) 78 (D) 88

130. If two particles are associated with same kinetic energy, then the de-Broglie's wavelength (λ) of these particles is
(A) directly proportional to the velocity
(B) inversely proportional to the velocity
(C) independent of mass and velocity (D) Cannot be predicted

131. The increasing order of the first ionisation enthalpies of the elements B, P, S and F is
(A) F < S < P < B (B) P < S < B < F
(C) B < P < S < F (D) B < S < P < F

132. In the relation, Electronegativity $= \frac{0.359\ Zeff}{r^2} + 0.744$, r is

(A) Metallic radius (B) Ionic radius
(C) Vander waals radious (D) Covalent radius

133. The species in which the central atom uses sp^2 hybrid orbitals in its bonding is

(A) NH_3 (B) PH_3 (C) CH_3^+ (D) SbH_3

134. The molecule with the highest dipole moment is

(A) CH_2Cl_2 (B) CH_3Cl (C) $CHCl_3$ (D) CCl_4

135. The dimension of coefficient of viscosity

(A) MLT (B) $ML^{-1}T^{-1}$ (C) MLT^{-1} (D) MLT^{-2}

136. At STP, O_2 gas present in a flask was replaced by SO_2 under similar conditions. The mass of SO_2 present in the flask will be

(A) half that of O_2 (B) equal to that of O_2
(C) twice that of O_2 (D) one-third of O_2

137. In a reversible process, if the changes in entropy of the system and its surroundings are ΔS_1 & ΔS_2 respectively, then

(A) $\Delta S_1 + \Delta S_2 > 0$ (B) $\Delta S_1 + \Delta S_2 < 0$
(C) $\Delta S_1 + \Delta S_2 = 0$ (D) $\Delta S_1 + \Delta S_2 \geq 0$

138. The volume of a gas is reduced to half from its original volume. The specific heat will

(A) double (B) remain constant
(C) reduce to half (D) increase four times

139. The reaction, $A(g) + 2B(g) \rightleftharpoons 2C(g) + D(g)$ was studied using an initial concentration of B which was 1.5 times that of A. The equilibrium concentration of A and C were found to be equal. So, Kc for the equilibrium is

(A) 0.32 (B) 2.73 (C) 4.0 (D) 8.17

140. A mixture containing N_2 and H_2 in a mole ratio 1 : 3 is allowed to attain equilibrium when 50% of the mixture has reacted. If P is the pressure at equilibrium, then the partial pressure of NH_3 formed is

(A) P/2 (B) P/3 (C) P/5 (D) P/9

141. Oxidation number of P in pyrophosphoric acid is

(A) +1 (B) +3 (C) +4 (D) +5

142. The amount of H_2O_2 required for decolourising 1 mol of $KMnO_4$ in an acid solution is
(A) 1.5 mol (B) 2.0 mol (C) 2.5 mol (D) 3.0 mol

143. The process by which hydrogen is prepared by the reaction of silicon, iron alloy and NaOH, is
(A) Haber's process (B) Silicon process
(C) Wood process (D) Bosch process

144. Which of the followings does NOT get reduced by H_2 in its aqueous solution?
(A) Cu^{2+} (B) Fe^{3+} (C) Zn^{2+} (D) Ag^{+}

145. The compound which is used to extinguish fire caused by combustion of alkali metals is
(A) CCl_4 (B) Sand (C) Water (D) Kerosene

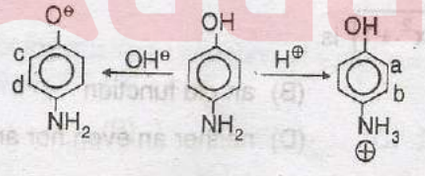
146. The compound whose aqueous solution is called 'baryta water' is
(A) $BaSO_4$ (B) BaO (C) $BaCO_3$ (D) $Ba(OH)_2$

147. The optically active alkane of lowest molecular mass which is also chiral is
(A) 3-methylhexane (B) 2, 3-dimethylpentane
(C) 2-methylhexane (D) 2, 5-dimethylhexane

148. Bond lengths of C-H, C-O, C-C and C=C follow the sequence
(A) C-H < C-O < C-C < C=C (B) C-H < C=C < C-O < C-C
(C) C-C < C=C < C-O < C-H (D) C-O < C-H < C-C < C=C

149. Nitrobenzene is prepared from benzene by using conc. HNO_3 and conc. H_2SO_4. In the nitrating mixture, nitric acid acts as a/an
(A) Base (B) Acid (C) Reducing agent (D) Catalyst

150. In strong acidic and alkaline medium, *p*-aminophenol exists in (X) and (Y) forms respectively



Thus, in acidic and alkaline medium, electrophilic substitution occurs at
(A) a, c (B) a, d (C) b, c (D) b, d

MATHEMATICS
Question : 50

151. The lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and $\frac{x-1}{-2}=\frac{y-2}{-4}=\frac{3-z}{6}$ are

(A) coincident (B) skew (C) intersecting (D) parallel

152. The intercept made by the plane $\vec{r}.\vec{n}=q$ on the x-axis is

(A) $\frac{q}{\hat{i}.\hat{n}}$ (B) $\frac{\hat{i}.\hat{n}}{q}$ (C) $-\frac{\hat{i}.\hat{n}}{q}$ (D) $\frac{q}{|\vec{n}|}$

153. Value of λ such that the line $\frac{x-1}{2}=\frac{y-1}{3}=\frac{z-1}{\lambda}$ is perpendicular to normal to the plane $\vec{r}.\left(2\hat{i}+3\hat{j}+4\hat{k}\right)=0$ is

(A) $-\frac{13}{4}$ (B) $-\frac{17}{4}$ (C) 4 (D) $-\frac{11}{4}$

154. In the expansion of $(1+x)^n$, the binomial co-efficients of three consecutive terms are respectively 220, 495 and 792. The value of n is

(A) 10 (B) 11 (C) 12 (D) 13

155. The function of $f(x)=\log\left(x+\sqrt{x^2+1}\right)$ is

(A) an even function (B) an old function

(C) a periodic function (D) neither an even nor an odd function

156. If $A=\{x : x=4n+1, 2\le n\le 5\}$, then the number of subsets of A is

(A) 16 (B) 15 (C) 4 (D) None of these

157. If $f: R \to R$ satisfies $f(x+y) = f(x) + f(y)$ for all $x, y, \in R$ and $f(1) = 7$, then $\sum_{r=1}^{n} f(r)$ is

(A) $\frac{7n}{2}$ (B) $\frac{7(n+1)}{2}$ (C) $7n(n+1)$ (D) $\frac{7n(n+1)}{2}$

158. If $|Z^2 - 1| = |Z|^2 + 1$ then Z lies on

(A) the real axis (B) the imaginary axis

(C) a circle (D) an ellipse

159. The value of $\frac{4(\cos 75^0 + i \sin 75^0)}{0.4(\cos 30^0 + i \sin 30^0)}$ is

(A) $\frac{\sqrt{2}}{10}(1+i)$ (B) $\frac{\sqrt{2}}{10}(1-i)$ (C) $\frac{10}{\sqrt{2}}(1-i)$ (D) $\frac{10}{\sqrt{2}}(1+i)$

160. The value of $\sum_{k=1}^{10}\left(\sin\frac{2k\pi}{11} + i\cos\frac{2k\pi}{11}\right)$ is

(A) 1 (B) −1 (C) −i (D) i

161. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 30^0$ and $\tan 15^0$ respectively, then the value of $2 + q - p$ is

(A) 0 (B) 1 (C) 3 (D) 2

162. If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0$, then the roots are

(A) 0, 1 (B) −1, 1 (C) 0, −1 (D) −1, 2

163. Solution of the inequation $4^{-x+0.5} - 7.2^{-x} < 4$, $x \in R$ is

(A) $(-2, \infty)$ (B) $(2, \infty)$ (C) $\left(2, \frac{7}{2}\right)$ (D) None of these

164. The largest interval for which $x^{12} - x^9 + x^4 - x + 1 > 0$ is

(A) $-4 < x \leq 0$ (B) $0 < x < 1$ (C) $-100 < x < 100$ (D) $0 < x < \infty$

165. The smallest positive integer n for which

$n! < \left(\frac{n+1}{2}\right)^n$ holds is

(A) 1 (B) 2 (C) 3 (D) 4

166. The number of integral solutions of $x^2 + y^2 = x^2y^2$ is

(A) 0 (B) 1 (C) infinite (D) None of these

167. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order ?

(A) 120 (B) 240 (C) 360 (D) 480

168. The sum of the series $\frac{1}{1.2} - \frac{1}{2.3} + \frac{1}{3.4} \cdots$ upto ∞ is equal to

(A) $2 \log_e 2$ (B) $\log_e 2 - 1$ (C) $\log_e 2$ (D) $\log_e \left(\frac{4}{e}\right)$

169. Let a_1, a_2, a_3..... cannot be terms of an A.P.

If $\frac{a_1 + a_2 + ... + a_p}{a_1 + a_2 + ... + aq} = \frac{p^2}{q^2}$, $p \neq q$ then $\frac{a_6}{a_{21}}$ equals

(A) $\frac{7}{2}$ (B) $\frac{2}{7}$ (C) $\frac{11}{41}$ (D) $\frac{41}{11}$

170. If the slope of the line joining the points A(x, 2) and B(6, –8) is $-\frac{5}{4}$, then x = ?

(A) –2 (B) 2 (C) –3 (D) 3

171. The equation of the perpendicular bisector of the line joining the points A (2, 3) and B (6, –9) is

(A) $x + 2y - 6 = 0$ (B) $x - 2y - 6 = 0$

(C) $x + 2y + 6 = 0$ (D) $x - 2y + 6 = 0$

172. If A (–1, 3) and B (α, β) be the extremities of the diameter of the circle $x^2 + y^2 - 6x + 5y - 7 = 0$, then

(A) $\alpha = -7, \beta = 8$ (B) $\alpha = 7, \beta = -8$

(C) $\alpha = -6, \beta = 7$ (D) $\alpha = 6, \beta = -7$

173. If the parabola $y^2 = 4ax$ passes through the point P(3, 2), then the length of its latus rectum is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{4}{3}$ (D) 4

174. One focus of hyperbola is at (0, 4) and the length of its transverse axis is 6. The equation of the hyperbola is

(A) $\frac{x^2}{7} - \frac{y^2}{9} = 1$ (B) $\frac{y^2}{9} - \frac{x^2}{7} = 1$ (C) $\frac{y^2}{4} - \frac{x^2}{9} = 1$ (D) None of these

175. The foci of an ellipse are $(0, \pm 6)$ and the length of its minor axis is 16. The equation of the ellipse is

(A) $\frac{x^2}{16}+\frac{y^2}{36}=1$ (B) $\frac{x^2}{36}+\frac{y^2}{64}=1$ (C) $\frac{x^2}{100}+\frac{y^2}{64}=1$ (D) $\frac{x^2}{64}+\frac{y^2}{100}=1$

176. State which of the following is total number of relations from set A = {1, 2, 3, 4} to set B = {d, e} is—

(A) 2^4 (B) 2^6 (C) 2^8 (D) 2^{15}

177. Let A = {a, b, c, d} and $f : A \to A$ be defined by, $f(a) = d$, $f(b) = a$, $f(c) = b$ and $f(d) = c$. State which of the following is equal to $f^{-1}(b)$?

(A) {a} (B) {b} (C) {c} (D) {d}

178. If the binary operation on Z is defined by $a*b = a^2-b^2+ab+4$, then the value of $(2*3)*4$ is

(A) 233 (B) 33 (C) 55 (D) -55

179. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, state which of the following is the value of x ?

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) $\frac{\sqrt{3}}{2}$

180. Given the LPP, Min. $Z = 3x - y$,
Subject to the constraints
$2x + 3y \geq 1$
and $x, y \geq 0$
The optimum solution of the LPP is

(A) $x = 0, y = \frac{1}{2}$ (B) $x = 0, y = \frac{1}{3}$

(C) $x = \frac{1}{3}, y = 0$ (D) $x = \frac{1}{2}, y = 0$

181. In a linear programming problem, the equation $2x + 3y = 12$ in two unknowns has number of solutions equal to

(A) maximum value of and minimum value of
(B) a particular value of and
(C) infinite (D) None of these

182. Let A be a square matrix of order 3x3, then $|KA|$ is equal to

(A) $K|A|$ (B) $K^2|A|$ (C) $K^3|A|$ (D) $3K|A|$

183. The system of equations
$\alpha x + y + z = \alpha - 1$
$x + \alpha y + z = \alpha - 1$
$x + y + \alpha z = \alpha - 1$
has no solution, if α is

(A) 1 (B) not –2 (C) either –2 or 1 (D) –2

184. Matrix $A = \begin{bmatrix} 1 & 0 & -k \\ 2 & 1 & 3 \\ k & 0 & 1 \end{bmatrix}$ is invertible for

(A) k = 1 (B) k = –1 (C) all real k (D) None of these

185. If matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 1 & 2 & -1 \\ 0 & 1 & 1 \end{bmatrix}$ and $A^{-1} = \frac{1}{k}$ adj A, then k is

(A) 7 (B) –7 (C) 1/7 (D) 11

186. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then the probability of 2 successes is

(A) $\frac{37}{256}$ (B) $\frac{219}{256}$ (C) $\frac{128}{256}$ (D) $\frac{28}{256}$

187. If $P(A \cup B) = 0.8$ and $P(A \cap B) = 0.3$, then $P(A') + P(B')$ equals to

(A) 0.9 (B) 0.7 (C) 0.5 (D) 0.3

188. The value of f at x = 0 so that function $f(x) = \frac{2^x - 2^{-x}}{x}$, $x \neq 0$, is continuous at x = 0, is

(A) 0 (B) log2 (C) log4 (D) e^4

189. The rate of change of the function $y = f(x)$ w.r.t. x at the point x is

(A) $\frac{1}{2}f'(x)$ (B) $2f'(x)$ (C) $\frac{f'(x)}{f(x)}$ (D) None of these

190. The slope of the tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at the point $(a\cos\theta, b\sin\theta)$ is

(A) $\frac{b}{a}\tan\theta$ (B) $\frac{b}{a}\cot\theta$ (C) $-\frac{b}{a}\tan\theta$ (D) $-\frac{b}{a}\cot\theta$

191. A function f(x) is defined in $a < x < b$ and $a \leq x_1 \leq x_2 < b$; then f(x) is strictly monotor decreasing in $a \leq x \leq b$ when

(A) $f(x_2) > f(x_1)$ when $x_2 > x_1$ (B) $f(x_2) < f(x_1)$ when $x_2 > x_1$
(C) $f(x_2) > f(x_1)$ when $x_2 < x_1$ (D) $f(x_2) < f(x_1)$ when $x_2 < x_1$

192. If $0 \leq x \leq 2\pi$, the function $f(x) = \sin x$ is minimum at

(A) $x = \frac{3\pi}{2}$ (B) $x = \pi$ (C) $\frac{3\pi}{4}$ (D) $x = 2\pi$

193. The value of is $\int(\operatorname{cosec} 2x \cot 2x)\,dx$ is

(A) $-\frac{\cot 2x}{2}+c$ (B) $2\cot 2x + c$
(C) $-2\operatorname{cosec} 2x + c$ (D) $-\frac{\operatorname{cosec} 2x}{2}+c$

194. If $\int_0^{\pi} xf(\sin x)\,dx = A\int_0^{\frac{\pi}{2}} f(\sin x)\,dx$, then A is equal to

(A) 0 (B) π (C) $\frac{\pi}{4}$ (D) 2π

195. The order and degree of the differential equation

$\left(1+3\frac{dy}{dx}\right)^{\frac{2}{3}} = 4\frac{d^3y}{dx^3}$ are

(A) $1, \frac{2}{3}$ (B) 3, 1 (C) 3, 3 (D) 1, 2

196. The solution of the differential equation
$y\,dx + (x + x^2y)\,dy = 0$ is

(A) $-\frac{1}{xy} = c$ (B) $-\frac{1}{xy} + \log y = c$

(C) $\frac{1}{xy} + \log y = c$ (D) $\log y = cx$

197. If $\int e^{ax} \sin bx\,dx = \frac{e^{ax}}{\sqrt{a^2+b^2}} \sin(bx+m) + c$, then the value of m is

(A) $-\tan^{-1}\frac{b}{a}$ (B) $\tan^{-1}\frac{b}{a}$ (C) $\tan^{-1}\frac{a}{b}$ (D) $-\tan^{-1}\frac{a}{b}$

198. If the position vectors of the points P and Q are $2\hat{i} + \hat{k}$ and $-3\hat{i} - 4\hat{j} - 5\hat{k}$ respectively, then vector $\overrightarrow{QP}$ is

(A) $5\hat{i} + 4\hat{j} + 4\hat{k}$ (B) $5\hat{i} + 4\hat{j} + 6\hat{k}$ (C) $5\hat{i} - 4\hat{j} + 4\hat{k}$ (D) $-\hat{i} - 4\hat{j} - 4\hat{k}$

199. If a line whose direction ratios are proportional to 0, 1, –1 then the inclination of the line with z-axis is

(A) $\frac{\pi}{2}$ (B) π (C) $\frac{3\pi}{2}$ (D) $\frac{3\pi}{4}$

200. If the line $\frac{x-x_1}{a} = \frac{y-y_1}{b} = \frac{z-z_1}{c}$ is parallel to z-axis then

(A) $a = c = 0$ and $b \neq 0$ (B) $a = b = 0$ and $c \neq 0$

(C) $b = c = 0$ and $a \neq 0$ (D) $a = b = c = 0$

BIOLOGY
Question : 50

151. If vagus/parasympathetic nerve to heart is cut, the heart beat will
(A) stop (B) remain normal (C) increase (D) decrease

152. Which of the following hormones causes reabsorption of Na^+ and excretion of K^+, H^+ and H_2O?
(A) LH (B) FSH (C) TSH (D) Aldosterone

153. Which of the following animals having longitudinal binary fission?
(A) *Hydra* (B) *Plasmodium* (C) *Paramoecim* (D) *Euglena*

154. Vegetative propagation in mint occurs by
(A) Offset (B) Runner (C) Sucker (D) Rhizome

155. Formation of an organism from a single, male gamete without fusion with egg is an example of
(A) Apogamy (B) Parthenogenesis (C) Parthenocarpy (D) Apospory

156. Decrease in levels of which of the following causes menstrual flow?
(A) Progesterone (B) Vasopressin (C) FSH (D) Oxytocin

157. Spermatozoa are nourished during development by
(A) Leydig cell (B) Sertoli cell (C) Germinal epithelium (D) Mitochondria

158. Genital warts STD is a viral disease and is caused by
(A) *Trichomonas vaginalis* (B) *Treponema pallidum*
(C) *Human papilloma virus* (D) *Chlamydia trachomatis*

159. The technique called gamete intrafallopian transfer (GIFT) is recommended for those females
(A) who cannot retain foetus inside uterus
(B) who cannot produce ovum
(C) who cannot provide suitable environment for fertilization
(D) whose cervical canal is too narrow, to allow passage for sperms

160. A method of birth control is
(A) IUDs (B) HJF (C) IVF-ET (D) GIFT

161. The linked characters would always inherit together till they are
(A) mutated (B) delinked due to segregation
(C) separated due to crossing over (D) masked by dominance

162. Down's syndrome is a typical case of
(A) Nullisomy (B) Monosomy (C) Gene mutation (D) Trisomy

163. Leading strand during DNA replication is formed
(A) in short segment (B) continuously
(C) first (D) ahead of replication

164. Neo-Darwinism believes that new species develop through
(A) mutations with natural selection
(B) continuous variations with natural selection
(C) hybridisation (D) mutations

165. Genetic drift operates in --------- population
(A) small (B) large (C) island (D) mendelian

166. Which of the following is quartan in periodicity?
(A) *P. ovale* (B) *P. vivax* (C) *P. falciparum* (D) *P.malariae*

167. B.C.G. is vaccine against
(A) Typhoid (B) Tuberculosis (C) German measles (D) Chicken pox

168. In tissue culture variations appeared are
(A) Somatic variation (B) Clonal variation
(C) Somaclonal variation (D) Tissue culture variation

169. A common bio control agent for the control of plant diseases is
(A) *Bacillus* (B) *Trichoderma* (C) *Baculovirus* (D) *Glomus*

170. The technique for breakage of DNA fragment and inserting it into another DNA molecule, is related to
(A) Gene cloning (B) Gene typing
(C) Gene splicing (D) DNA fingerprinting

171. Which type of restriction enzymes are used in recombinant DNA technology?
(A) Type-I (B) Type-II (C) Type-III (D) All of these

172. Which of the following bacteria has found extensive use in genetic engineering work in plants/best genetic vector used in plants ?
(A) *Bacillus thuringiensis* (B) *Xanthomonas citri*
(C) *Agrobacterium tumefaciens* (D) *E. coli*

173. An abnormal gene is replaced by normal gene. It is called
(A) Gene therapy (B) Cloning (C) Mutation (D) None of these

174. Geographic limit within which a population exists is called
(A) Biome (B) Habitat (C) Niche (D) Ecosystem

175. $\frac{\Delta Nn}{\Delta Nt}$ = B represents
(A) Natality (B) Growth rate (C) Mortality (D) All of these

176. Animals with built in thermostat are
(A) poikilothermic (B) oligothermic (C) homeothermic (D) biothermic

177. The lowest category in taxonomic hierarchy is
(A) class (B) kingdom (C) species (D) phylum

178. Most primitive number in which roots are NOT present is
(A) *Rhynia* (B) *Psilotum* (C) *Lycopodium* (D) *Selaginella*

179. Angiosperms differ from gymnosperms in having
(A) seeds (B) large leaves (C) tap roots (D) covered seeds

180. Green glands are the excretory organs of
(A) Insecta (B) Myriapoda (C) Arachnida (D) Crustacea

181. Which tissue give mechanical strength to plant organs?
(A) Accessory cells (B) Collenchyma (C) Parenchyma (D) Stomata

182. In which flower epipetalous stamen is found?
(A) *Calotropis* (B) *Sesbania* (C) *Datura* (D) *Acalypha*

183. Which of the following is superficial of calf muscle?
(A) Trapezius (B) Latissimus (C) Gluteus (D) Gastrocnemius

184. During inspiration in cockroach the respiratory passage is
(A) Stigmata (B) Air chamber
(C) Spiracle and trachea (D) Longitudinal respiratory tube

185. The function of the collaterial gland in cockroach is to
(A) store eggs (B) store sperms
(C) keep vagina moist (D) secretate the egg case

186. Golgi apparatus takes part in
(A) Carbohydrate synthesis (B) Lipid synthesis
(C) Protein synthesis (D) Oxydative photophosphorylation

187. The longest living cells amongst the following are
(A) T-cells (B) B-cells (C) Memory cells (D) RB

188. Mitochondria increases in the cells of
(A) dry seed (B) dormant seed
(C) germinating seed (D) ripening fruits

189. What holds the ribosomes together in a polyribosome?
(A) mRNA (B) rRNA (C) tRNA (D) mRNA, rRNA & tRNA

190. Some inorganic ions are required for enzyme activity. These inorganic substances are
(A) enzyme (B) co-factor (C) prosthetic group (D) activator

191. Diploid chromosome number being 8, what shall be the number of chromatids in each daughter after Meiosis-I ?
(A) 2 (B) 4 (C) 8 (D) 16

192. Potassium ion exchange hypothesis of opening and closing of stomata was proposed by
(A) Sayre (B) Stewart (C) Levitt (D) Bose

193. If a cell 'X' has op=6 and TP=5 and is surrounded by the cell with op=4 and TP=2, then what will be the direction of water movement?
(A) From other cell to cell 'X' (B) From cell 'X' to other cell
(C) Water absorption is not affected by temperature.
(D) Water will move freely.

194. Bidirectional translocation of minerals takes place through
(A) xylem (B) phloem (C) parenchyma (D) cambium

195. The intermediate between Glycolysis and TCA cycle is
(A) Oxaloacetate (B) Glucose-1-6 diphosphate
(C) Pyruvic acid (D) Acetyl Co-A

196. Out of 38 ATP molecules produced per glucose, 22 ATP molecules are formed from $NADH/FADH_2$ in
(A) Respiratory chain (B) Kreb's cycle
(C) Oxidative decarboxylation (D) EMP

197. The maximum growth rate occurs in
(A) exponential phase (B) lag phase
(C) stationary phase (D) senescent phase

198. Mobilisation of stored food in germinating seed is triggered by
(A) Auxin (B) Cytokinin (C) Gibberellin (D) Ethylene

199. Digestive enzymes are released by pancreas and bile is released by liver in response to the hormone
(A) Zymogen (B) Cholecystokinin (C) Insulin (D) Secretin

200. After O_2 diffusion into pulmonary capillaries, it diffused into_____ and binds with_____.
(A) RBC, haemoglobin (B) RBC, CO_2
(C) Interstitial fluid, CO_2 (D) Interstitial fluid, RBC