AP – POLYCET

2016

Time : 2 Hours **Total Marks : 120**

Note : Before answering the questions, read carefully the instructions given on the OMR sheet.

SECTION – I

Mathematics

1. Which of the following is not a linear equation ?
   A. $5+4x=y+3$
   B. $x+2y=2y$
   C. $3-x=y^2+4$
   D. $x+y=0$
2. The solution set {x, y} of the system of. equations x - 2y = 0 and 3x + 4y = 20 is
   A. {2, 4
   B. {4,2}
   C. {1. 2}

D. $\{2, 1\}$

3. The two lines
$3x+2y-80=0$ *and* $4x+3y-110=0$ *are*
   A. coincident lines
   B. parallel lines
   C. intersecting lines
   D. None

4. The perimeter of a rectangular plot is 32 m. If the length l is increased by 2 m and the breadth b is decreased by 1 m, the area of the plot remains the same. Then the values of l and b are respectively
   A. 6m, 10m
   B. 10 m, 6m
   C. 10 m, 10m
   D. 6m, 6m

5. The solution of the equations $\frac{x+y}{xy}=2$ and $\frac{x-y}{xy}=6$ is
   A. $\left\{\frac{-1}{2},4\right\}$
   B. $\left\{2,\frac{-1}{4}\right\}$
   C. $\left\{\frac{-1}{2},\frac{-1}{4}\right\}$

D. $\left\{\frac{-1}{2}, \frac{1}{4}\right\}$

6. The root of $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$ are

A. -1, 2
B. 1, 2
C. 1, -2
D. -1, -2

7. If A is the solution set $x^2 - 5x + 6$ and B is the solution set of $x - \sqrt{3x-6} = 2$, then $A \cap B =$

A. ϕ
B. A
C. B
D. (2)

8. If $\propto$ and β. Are roots $ax^2 + bx + c = 0$ then $\alpha^3 + \beta^3 =$

A. $\frac{3abc - b^3}{a^2}$
B. $\frac{3abc - b^3}{c^3}$
C. $\frac{b^2 - 3abc}{a^3}$
D. $\frac{b^2 - 3abc}{c^3}$

9. The equation whose roots are obtained by adding 1 to those of $2x^2 + 3x + 5 = 0$ is
   A. $2x^2 - x - 4 = 0$
   B. $2X^2 + x - 4 =$
   C. $2x^2 - x + 4 = 0$
   D. None
10. The number of numbers between 100 and 1000 which are divisible by 7 is
   A. 7
   B. 128
   C. 132
   D. None
11. The least value of n for which $1+2+2^2$ + (n terms) is greater than 1000 is
   A. 7
   B. 8
   C. 9
   D. 10
12. If the roots of $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ are equal, then a, b, c are in
   A. AP
   B. GP
   C. HP
   D. None

13. If (a, 2) lies in II quadrant, then (-a, -2) lies in the which quadrant?
    A. I
    B. II
    C. III
    D. IV
14. The quadrilateral formed by the points A(Q - 1), B(2, 1), C(0, 3) and D(-2, 1) A taken in the same order is
    A. rectangle
    B. paralleltigrism
    C. square
    D. rhombus
15. If P(3, 4) and Q(7, 7) are two points and PR = 10, where P, Q and R are collinear, then R =
    A. (10, 10)
    B. (11, 11)
    C. (11, 10)
    D. (11, -10)
16. If (-2. 1), (1, 0) and (4, 3) are three consecutive vertices of a parallelogram, then the fourth vertex is
    A. (2. 1)
    B. (1, 4)
    C. (0, 0)
    D. (2, 2)

17. The slope of the line passing through (2, 5) and (4, 7) is
    A. 2
    B. $\frac{5}{6}$
    C. 4
    D. 1
18. A joker's cap is in the form of a right-circular cone whose base radius is 7 cm and height is 24 cm. The area of the sheet required to make 10 such caps is
    A. 550 cm^2
    B. 5500 cm^2
    C. 55000 cm^2
    D. None
19. A right-circular cylinder has base radius 14 cm and height 21 cm. The curved surface area is
    A. 1848 cm^2
    B. 616 cm^2
    C. 3080 cm^2
    D. 12936 cm^2
20. The volume of the sphere of radius 21 cm Is
    A. 5544 cm^3
    B. 38808 cm^3
    C. 1155 cm^3
    D. 8983 cm^3

21. If $\cos A = \frac{12}{13}$, then $\sin A$

A. $\frac{5}{13}$

B. $\frac{5}{12}$

C. $\frac{12}{13}$

D. $\frac{13}{5}$

22. $\frac{\sin 30^o \tan 45^o - \cos ec 60^o}{\cot 45^o + \cos 60^o - \sec 30^o} =$

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

23. If tan2A = cot (A – 18°), where 2A is an acute angle, then A =

A. 6°

B. 18°

C. 36°

D. 54°

24. If x = a cosec θ and y = b cot θ, then $b^2x^2 - a^2y^2 =$

A. $a^2 + b^2$

B. a^2b^2

C. $\dfrac{a^2+b^2}{a^2-b^2}$

D. None

25. tan 30°, tan 45°, tan 60° are in

A. $1-2\sin^2\theta$

B. $2\sin^2\theta$

C. $\sec\theta$

D. $\cos ec\theta$

26. $\cos^4\theta-\sin^4\theta$

A. $1-2\sin^2\theta$

B. $2\sin^2\theta$

C. $\sec\theta$

D. $\cos ec\theta$

27. A boy observes the top of an electric nole at an angle of elevation of 60°, when the observation point is 8 m away from the foot of the pole. Then the height of the pole is

A. $6\sqrt{3}$ m

B. $8\sqrt{3}$ m

C. $10\sqrt{3}$ m

D. $16\sqrt{3}$ m

28. Rajender observes a person standing on the ground from a helicopter at an angle of depression 45° If the

helicopter flies at a height of 50 m from the ground; Then the distance of the person from Rajender is

A. $25\sqrt{2}$
B. $50\sqrt{2}$
C. $75\sqrt{2}$
D. None

29. From a ship masthead 150 ft high, the angle of depression of a boat is observed to be 45° Its distance from the ship is

A. 150 ft
B. 75 ft
C. $150\sqrt{3}$ ft
D. $\frac{150}{\sqrt{3}}$

30. A ladder of 19 m is leaning to a wall making an angle of 60* with the ground. The distance from the foot of the wall to the foot of the ladder is

A. 18 m
B. 19 m
C. 9 m
D. 9.5 in

31. The probability of getting a head when a coin is tossed once is

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. 1

32. Rahim takes out all the 'hearts from a deck of 52 cards. The probability of picking a diamond is

A. $\frac{1}{13}$

B. $\frac{1}{39}$

C. $\frac{1}{3}$

D. $\frac{1}{52}$

33. The probability of an impossible event is

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. 1

34. The arithmetic mean of 12, 15, 13, 20, 25 is

A. 17

B. 20

C. 18
D. None

35. If 5 is added to each and every item of a data, then the arithmetic mean is
    A. 5 times to the first arithmetic mean
    B. increased by 5 to the first arithmetic mean
    C. equal to the first arithmetic mean
    D. None
36. The median of 24, 20, 32, 18, A 14 25 is
    A. 18
    B. 16
    C. 24
    D. 32
37. The median. of the following distribution is

Class internal	0-9	10-19	20-19	30-39
Frequency	10	16	24	29

    A. 23.75
    B. 23.25
    C. 25.125
    D. None
38. For the data 9, 8, 7, 7, 6, 3, 7, 2, 1, 7, 9, the mode is
    A. 9
    B. 7

C. 3

D. 2

39. The modal class of the following distribution is

Family size	1-3	3-5	5-7	7-9
Frequency`	7	8	2	1

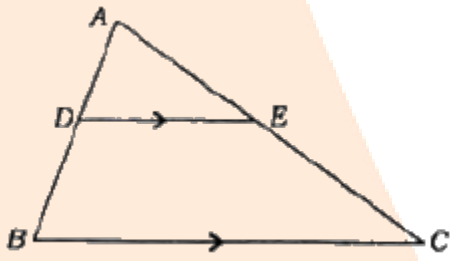
A. 1-3

B. 3-5

C. 5-7

D. None

40. In $\Delta ABC, DE \| BC$ and $\frac{AD}{DB} = \frac{3}{5}$. If $AC = 5.6cm,$ then $AE =$



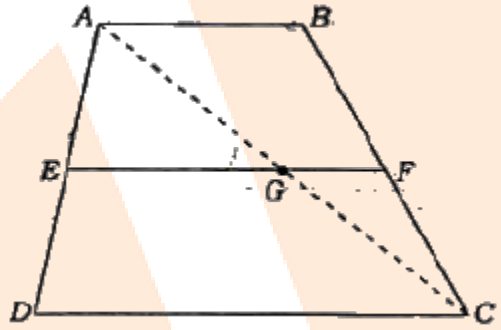
A. 2cm

B. 2.1 cm

C. 2.2 cm

D. 2.5 cm

41. In a trapezium $ABCD$, AB||DC E and F are points on non-parallel side§ AD and BC respectively such that $\frac{AE}{ED} =$



A. $\frac{FC}{BF}$

B. $\frac{ED}{AE}$

C. $\frac{BF}{PC}$

D. None

42. Given that Δ ABC - Δ DEF and their areas are 64 cm^2 and 121 cm^2 respectively. If EP = 15.4 cm, then BC =

A. 2.11 cm

B. 21.1 cm

C. 1.21 cm

D. 11.2 cm

43. If BL and CM are the medians of a triangle ABC right angled at A, then the value of 4 (BL^2 + CM^2)=

A. $3BC^2$
B. $5BC^2$
C. $7BC^2$
D. BC^2

44. If ABD is a triangle right angled at A and AC⊥BD, then AC^2 =
A. BC.BD
B. BD .CD
C. BC.DC
D. AD.AB

45. The number of pairs of parallel tangents to a circle is
A. 2
B. 4
C. 1
D. infinitely many

46. The length of the tangent to a circle whir centre 0 and radius = 6 cm from a point P outside the circle such that OP = 10 cm is
A. 6 cm
B. 8 cm
C. 4 cm
D. 5 cm.

47. If PA and PB are the lengths of tangents drawn from an external point P to a circle, then
A. PA ≠ PB

B. PA > PB
C. PA < PB
D. PA = PB

48. The area of the sector, whose radius is 7 cm with angle 60°, is
A. 52.66 cm^2
B. 25.66 cm^2
C. 62.56 cm^2
D. 65.62 cm^2

49. 49. The number of circles passing through three collinear points in a plane is
A. 1
B. 0
C. 9
D. 12

50. The LCM of the number $2^7 \times 3^4 \times 7$ and $2^3 \times 3^3 \times 11$is
A. $2^3 \times 3^4$
B. $2^7 \times 3^4$
C. $2^7 \times 3^4 \times 7 \times 11$
D. $2^3 \times 3^4 \times 7 \times 11$

51. The number of rational numbers exist between any two distinct rational numbers is.
A. 0
B. 1
C. 2

D. infinite

52. The prime factorization of 163800 is
    A. $2^2 \times 3^3 \times 5^5 \times 7 \times 13$
    B. $2^2 \times 3^3 \times 5^2 \times 7 \times 13$
    C. $2^3 \times 3^2 \times 5^5 \times 7 \times 13$
    D. Noe
53. $\frac{1}{\log_x xy} + \frac{1}{\log_y xy} =$
    A. 0
    B. 1
    C. -1
    D. 2
54. If $\log_{10} 3 = 0.4771$, then the value of $\log_{15} + \log 2 =$
    A. 47.71
    B. 1.4771
    C. 4.77
    D. 0.4771
55. If A = {1, 2, 3, 4, 5} and B = {4, 5, 6, 7}, then A – B =
    A. {4, 5}
    B. {6, 7}
    C. {1, 2, 3}
    D. {1, 2, 3, 4, 5, 6, 7}
56. Among the following a null set (where N is the set of natural number)

A. $x : x^2 < 5$ and $x \in N$

B. $x : x^2 = 4$ and $x \in N$

C. $x : x^2 + 1 = 0, x \in N$

D. $x : x$ is even prime

57. If $A \subset B$, then A – B =

A. B

B. ϕ

C. A

D. B - A

58. The length of a rectangular dining hall is twice of its breadth. If x represents the breadth of the hall and its area is 5 sq. units, then the polynomial equation which represents the situation is

A. $5x^2 - 2 = 0$

B. $2x^2 - 5 = 0$

C. $x^2 - 25 = 0$

D. None

59. The sum of the zeros of the polynomial $p(x) = x^2 + 7x + 10$ is

A. 7

B. -7

C. 10

D. -10

60. If $p(x) = 2x^2 + 3x - 5$ then $p(2) =$

A. 2
B. 9
C. 0
D. -5

SECTION – II

Physics

61. The distance between the pole and focal point of a concave mirror is 15 cm. The radius of curvature is

A. 1.5 cm
B. 15 cm
C. 30 cm
D. 45 cm

62. Read the following two statements and pick the correct answer :

(a) Real image can be captured on screen.
(b) Virtual image can be captured on screen.

A. Both (a) and (b) are true
B. Both (a) and (b) are false
C. Only (a) is true
D. Only (b) is true

63. The filament of an electric bulb is usually made of
    A. copper
    B. germanium
    C. steel
    D. tugnstein
64. 1 joule/ 1 coulomb is
    A. 1 ampere
    B. 1 watt
    C. 1 weber
    D. 1 volt
65. The drift velocity of electrons in copper wire is about
    A. 0.07 mm/s
    B. 0.7 mm/s
    C. 7 mm/s
    D. 70 mm/s
66. Three resistors each of value 3 Q are connected in parallel combination. Their equivalen resistance is
    A. 9 Ω
    B. 1 Ω
    C. 0.33 Ω
    D. 1.5 Ω
67. At constant temperature, the ratio of potential difference to current is not constant for till following
    A. iron
    B. copper

C. Light Emitting Diode (LED)
D. aluminium

68. A bulb of resistance 200 Ω is connected to a 10 V battery. The power consumption is
A. 2 W
B. 20 W
C. 0.5 W
D. 0.05 W

69. A lemon kept in a glass of water appears to be bigger than its actual size. This is due to
A. reflection
B. refraction
C. total internal reflection
D. dispersion

70. If the critical angle is 45°, the refractive index of the material is
A. 0.5
B. 0.707
C. 1.
D. 1.414

71. If i and r be the angles of incidence and refraction respectively, when the light ray travels from glass to, air, then
A. i = r
B. I > r

C. I <r

D. None

72. Paraxial rays

A. are perpendicular to the principal axis

B. are very close to the principal axis

C. make an angle of 45° to the principal axis

D. pass through the principal axis

73. which one among the following cases, the convex lens does not give a real image?

A. When the object is placed between the focal point and optic centre

B. When the object is placed beyond the centre of curvature

C. When the object is placed between the centre of curvature and focal point

D. When the object is placed on the centre of curvature

74. Irrespective of the position of the object on the principal axis, a concave lens gives an image of nature

A. real, inverted

B. real, erected

C. virtual, inverted

D. virtual, erected

75. If a convex lens has its object and image distances equal (say x), the focal length is equal to
    A. x
    B. x /2
    C. 2 / x
    D. 0
76. Which part of the human eye helps the eye lens to change its focal length?
    A. Retina
    B. Pupil
    C. Ciliary muscle
    D. Cornea
77. For any position of an object in front of the human eye, the image distance is fixed at
    A. 1 cm
    B. 1.5 cm
    C. 2.5 cm
    D. 0.25 cm
78. To correct one's hypermetropia defect, the type of lens used is
    A. biconvex
    B. biconcave
    C. concavo-convex
    D. planoconcave

79. Read the following two statements and pick the correct answer:

A. Red colour light has low refractive index.

B. Red colour light undergoes low deviation.

1. Both (a) and (b) are true
2. Both (a) and (b) are false
3. only (a) is true
4. only (b) is true

80. Scattering of light involves the process of

A. bending of light at the interface of two media

B. splitting of light into different colours

C. convergence of light rays at the focus

D. re-emission of absorbed light

81. According to Faraday's law, the induced EMF produced in a closed loop is equal to the

A. magnetic flux

B. change of magnetic flux

C. rate of change of magnetic flux

D. cross-sectional area of the loop

82. If B is the magnetic flux density and A is the area of the plane, then the magnetic flux is given by

A. AB

B. B / A

C. A / B

D. A^2B

83. A conductor is moving with a speed of 10 m/s perpendicular to the direction of magnetic field of induction 0.5 T. If the induced EMF is 5 V, then the length of the conductor is

A. 0.25 m

B. 0.01 m

C. 4 m

D. 1 m

84. A metal ring is inserted through the soft iron cylinder which is wounded with copper wire. When DC is supplied between the ends of the coil, then

A. the metal ring is levitated on the coil and stays there

B. the metal ring is levitated and falls down immediately

C. the metal ring rotates round the cylinder at the same position

D. None

85. A charge q is moving with a velocity v in magnetic field of induction B. If the magnetic force acting on charge q is equal to quB, then

A. q is moving parallel to B

B. q is moving perpendicular to B

C. q is moving at an angle of 45^0 to B

D. q is stationary

86. Which among the following is an example for condensation?
    A. Water converting into ice
    B. Wet cloths getting dried
    C. Water converting into vapour
    D. Formation of dew
87. 127°C +400K + x = 1000 K. The value of x is
    A. 200 K
    B. 273 K
    C. 473 K
    D. 800 K
88. Which among the following materials has specific heat more than that of ice?
    A. water
    B. Glass
    C. Mercury
    D. Copper
89. Which among the following is used by the dentists to see the image?
    A. convex mirror
    B. concave mirror
    C. plane mirror
    D. convex lens
90. If u and v be the object and image distances for a spherical mirror, then the magnification is

A. u/v
B. v/u
C. -u/v
D. -v/u

SECTION – III

Chemistry

91. Which of the following salt solutions has pH greater than seven?
A. CH_3COOH
B. NH_4Cl
C. NaCl
D. CH_3COONa

92. Match the following:

a. Caustic soda	(i) $NaHCO_3$
b. Baking soda	(ii) $CaSO_4\ 2H_2O$
c. Gypsum	(iii) $CaSO_4\ .1/2H_2O$
d. Plaster of Paris	(iv) NaOH

A. (a) (b) (c) (d)
(i) (ii) (iii) (iv)
B. (a) (b) (c) (d)
(i) (iv) (iii) (ii)

C. (a) (b) (c) (d)
(iv) (i) (iii) (ii)
D. (a) (b) (c) (d)
(iv) (i) (ii) (iii)

93. $HCl + H_20$ X $+Cl^-$. The X may be
A. H_3O^+
B. OH^-
C. HOCl
D. H_2O^+

94. The maximum number of electrons accommodated in a subshell with azimuthal quantum number *l* is
A. $2l+1$
B. $4l+2$
C. $l\ (l+1)$
D. $4l-1$

95. The four quantum numbers for valence electron of sodium atom are
A. n=1, $l = 0$, m 0, s = 1/2
B. n=2, $l = 0$, m- 0, s= 1/2
C. n = 3, $l = 0$, m = 0, s =1/2
D. n = 3, $l = 1$, m = 0, s = 1/2

96. Degenerate orbitals have
A. same *l* value and same n value
B. different I value and same n value
C. same *l* value and different n value

D. same (n + *l*) value

97. Which pair of elements fits into same slot in Newlands' table of elements?
    A. F, Cl
    B. Co, Ni
    C. Mg, Ca
    D. C, Si

98. As per the modern periodic law, the properties of the elements are periodic functions of their
    A. atomic weights
    B. mass numbers
    C. atomic numbers
    D. valences

99. Elements of which group are called halogens?
    A. VA
    B. VIA
    C. VIIA
    D. IVA

100. Which of the following elements has larger atomic size?
    A. Na
    B. Mg
    C. Ca
    D. K

101. The correct order of electronegativity in the following elements is
    A. F>Cl>O
    B. F>O>CI
    C. O> F > CI
    D. Cl > F >O
102. The ionic bond forms easily between which groups of elements?
    A. IA and VIIA
    B. IIA and VA
    C. IA and VA
    D. IIA and VIA
103. Which of the following is a covalent compound?
    A. NaCI
    B. NH_3
    C. $MgCl_2$
    D. LiF
104. The bond angle in BF3 molecule is
    A. 120^0
    B. 180^0
    C. $109^028'$
    D. 104^0
105. The π bond is not found in
    A. $C_2 H_4$
    B. O_2

C. N_2

D. H_2O

106. The type of hybridization in CH4 molecule is

A. sp

B. sp^2

C. sp^3

D. sp^3d

107. The ore Fe_3O_4 is called Fe

A. magnetite

B. magnesite

C. haematite

D. pyrolusite

108. 2 ZnS+ $3O_2$ -→ 2 ZnO +$2S0_2$ This reaction is an example for

A. smelting

B. calcination

C. reduction

D. raosting

109. Which of the following processes is not suitable for refining of metals?

A. Poling

B. Distillation

C. Electrolytic refining

D. Froth floatation

110. Which of the following is a saturated hydrocarbon?
Oi e.oZ as.164 Ip_tdsoyw?
A. $C_2 H_4$
B. $C_2 H_2$
C. $C_3 H_6$
D. $C_2 H_6$

111. CH_3 —NH—CH_3 is known as
A. primary amine
B. tertiary amine
C. secondary amine
D. quaternary ammonium salt

112. The IUPAC name of the compound CH_3 — CH=CH=H_2
A. but-3-ene-1-yne
B. buta- 1, 2-diene
C. buta-2,3-diene
D. buta diene

113. Which of the following substituted products is not formed when methane reacts with chlorine in sunlight?
A. Chloroform
B. Carbon tetrachloride
C. Methylene chloride
D. Ethyl chloride

114. The process of conversion of starch and sugar into ethanol by using enzymes is called
    A. fermentation
    B. esterification
    C. carbonization
    D. pyrolysis
115. The general formula of ester is
    A. R--0--R
    B. R—CO--R
    C. R—COOR
    D. R—CHO
116. The chemical formula of marble is
    A. $CaCO_3$
    B. $Ca(OH)_2$
    C. CaO
    D. $Ca(HCO_3)_2$
117. $NaCI + AgNO_3 \rightarrow 4\ AgCl\downarrow + NaNO_3$ is an example for
    A. chemical combination
    B. chemical decomposition
    C. displacement reaction
    D. double displacement reaction
118. Coating the iron metal surface with a thin layer of zinc to protect the rusting of iron is called A. greasing
    B. galvanizing

C. tinning
D. electroplating

119. x Na + y H_2O → 2NaOH + H_2. In this balanced equation, the x, y values respectively are
A. 1, 1
B. 2, I
C. 1, 2
D. 2, 2

120. Which of the following solutions converts red litmus paper to blue?
A. HCI
B. HNO_3
C. NaOH
D. None