Write your Hall Ticket No.

29th SCIENCE TALENT SEARCH EXAMINATION - DECEMBER, 2016

Dr. A. S. RaoAwards Council, Hyderabad

SCREENING TEST

Q.P. CODE **A**

10th Class (E.M)

Max Marks:300   **Time: 3 Hours**

READ THE FOLLOWING INSTRUCTIONS BEFORE YOU START ANSWERING

1) You have to answer in OMR sheet given to you.

2) **Do shading in OMR sheet the correct question paper code as indicated at Right Top corner of this page**, otherwise your answers will be valued wrongly.

3) **Write your Hall Ticket Number (6 digit number) clearly in the space provided at top of this page & also in OMR sheet**.

4) This paper consists of Multiple Choice Questions in each subject in the order Mathematics, Physics, Chemistry & Biology.

5) Total number of questions is 100 (25 in each subject of 4 subjects). Please verify.

6) Each question carries THREE (3) Marks. **There may be one or more correct answers to a question.** You have to identify all the correct answers and have to darken/shade the corresponding circle or circles in **OMR sheet**. **No Marks will be given if you do not identify all the correct answers, if a question has more than one correct answer.**

7) You will not be permitted to leave the examination hall till the end of the test, even if you complete your answers before time.

8) Please verify for proper printing of all 100 Questions before you start answering

9) If there is any kind of misprinting, report to the invigilator and collect corresponding Question Paper Booklet, immediately.

10) **No complaints of misprint in Question Paper Booklet will be entertained after 30 Minutes from commencement of examination.**

11) **Time for this Test is 3 Hours**.

12) You are not allowed to have any kind of **Electronic gadgets of in the examination hall under any Circumstances**. If found you will not be allowed to answer and will be sent out of examination hall.

Please Turn Over

MATHEMATATICS

1) If $\sqrt{2}, -\sqrt{2}$ are two roots of $f(x) = 2x^4 - 3x^3 - 3x^2 + 6x + K = 0$, then

(A) $K = -2$

(B) $(x-1)$ is a factor of $f(x)$

(C) $(x+1)$ is a factor of $f(x)$

(D) Product of all roots of $f(x) = 0$ is -1

2) α *and* β are roots of the quadratic equation $ax^2 - 5x + 4 = 0$ then

(A) $\dfrac{1}{\alpha} + \dfrac{1}{\beta} = \dfrac{5}{4}$

(B) $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2} = \dfrac{a^2}{25 - 8a}$

(C) $\alpha^2 + \beta^2 = \dfrac{25 - 8a}{a^2}$

(D) the quadratic equation whose roots are $\dfrac{1}{\alpha}$ and $\dfrac{1}{\beta}$ is $4x^2 - 5x + a = 0$

3) Let $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ is a system of linear equations in x and y.

(A) If $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$, then the system of equations have infinite number of solutions

(B) If $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$, then the system of equations have infinite number of solutions

(C) If $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$, then the system of equations have only one solution

(D) If $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$, then the system of equations have no solutions

4) One hundred men in 10 days do one third of a work. The work is then required to be completed in another 13 days. On the next day (the eleventh day) 50 more men are employed, and on the 12th day, another 50. Till 18th day 200 men worked. Then

(A) work done by the end of 18th day $= \dfrac{17}{20} th$ part

(B) the number of more workers to be taken for the next two days to complete the work is 25

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(C) If the remaining work is to completed in 5 more days 110 workers should be terminated

(D) If the remaining work is to completed in 5 more days the number of workers to be employed is only 90.

5) Let $a,b,c \in N$. If $ax^2 + bx + c = 0$ and $2x^2 + 3x + 2 = 0$ has a common root then

(A) min. value of abc is 12   (B) min. value of abc is 1

(C) min. value of a+b+c is 7   (D) min. value of a+b+c is 5

6) $9x^2 - 9(a+b)x + 2a^2 + 5ab + 2b^2 = 0$ has

(A) real roots for $\forall a,b \in R$ (B) rational and unequal roots for $(a \neq b) a,b \in R$

(C) equal roots if $a = b$ (D) irrational roots if $a,b \in R$

7) Let A is not an odd multiple of a right angle. Then $\sec^4 A - \sec^2 A$ is equal to

(A) $\dfrac{1 - \cos^2 A}{\cos^4 A}$ (B) $\tan^4 A + \tan^2 A$ (C) $\tan^4 A \sec^2 A$ (D) $Sec^2 A \tan^2 A$

8) $\dfrac{\cos A}{1 - \tan A} + \dfrac{\sin A}{1 - \cot A} = $

(A) $\sin A - \cos A$ (B) $\sin A + \cos A$

(C) $\sqrt{2} \cos(45^0 - A)$ (D) $\sqrt{2} \sin(45^0 + A)$

9) In triangles ABC and DCB, $\underline{|ABC} = \underline{|DCB} = 90^0$ $\underline{|DBC} = 30^0$, and $AC \perp BD$, $DC = 3\sqrt{3} cm$ then

(A) $BD = 6\sqrt{3} cm$ (B) $BC = 9 cm$ (C) $AB = 9\sqrt{3} cm$ (D) $AB = 9 cm$

10) If $\tan^2 45^0 - \sin^2 30^0 = x \cos 45^0 \sin 45^0 \cot 30^0$ and

$$y \cos 60^0 \sin^2 45^0 \sec^2 45^0 \sec 60^0 = \tan^2 60^0 \cosec 30^0 \cot 45^0 \text{ then}$$

(A) $x = y$ (B) $x = \sin 60^0$ (C) $x^2 y = \dfrac{9}{2}$ (D) $x^2 + y = \dfrac{27}{4}$

11) If $\dfrac{\cot\theta - \cos\theta}{\cot\theta + \cos\theta} = \dfrac{2 - \sqrt{3}}{2 + \sqrt{3}}$ and $0^0 < \theta < 90^0$ then

(A) $\theta = 60^0$ (B) $\theta = 30^0$

(C) $\cos\theta + \sin\theta = \dfrac{\sqrt{3} + 1}{2}$ (D) $\tan\theta = \sqrt{3}$

12) $180^0 = \pi^c$ (radians) $= 100^g$ (grades) Using the information about the units of angles Choose the correct statements (or s) from the statements given below.

(A) $45^0 = \dfrac{\pi^c}{3}$ (B) $50^g = \dfrac{\pi^c}{2}$ (C) $75^0 = \dfrac{5\pi^c}{12}$ (D) $120^g = \dfrac{2\pi^c}{5}$

13) The shadow of a tower standing in a level plane is found to be 18m shorter when the sun's altitude changes from 30^0 to 45^0. Then
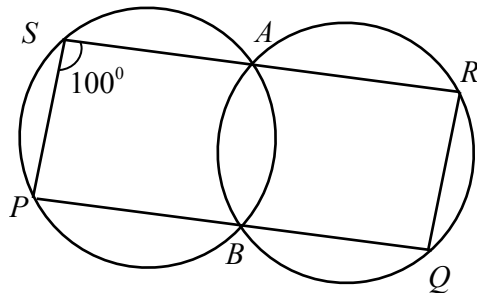
(A) height of the tower is $9\left(\sqrt{3}+1\right)m$

(B) length of the shadow when the sun's altitude is 30^0 is $9\,m$

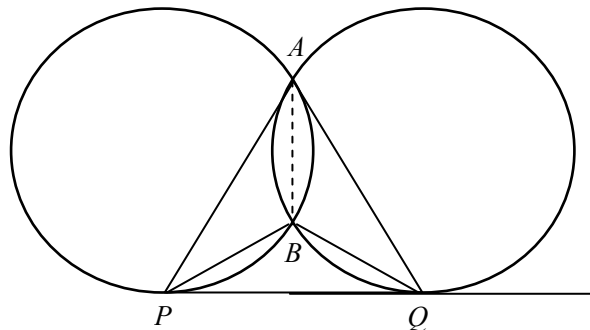(C) length of the shadow when the sun's altitude is 60^0 is $9+3\sqrt{3}m$

(D) height of the tower is 18m

14) In the given figure $\lfloor PSA = 100^0$, $\lfloor BPS = 85^0$ then

(A) $\lfloor ARQ = 85^0$ (B) $\lfloor ABQ = 100^0$ (C) $\lfloor BQR = 95^0$ (D) $\lfloor RAB = 85^0$

15) In the given figure, two circles are intersecting at A and B. PQ is a common tangent to the circles $\lfloor BPQ = 30^0$, $\lfloor BQP = 50^0$ then


(A) $\lfloor PAB = 30^0$ (B) $\lfloor PAQ = 80^0$

(C) $\lfloor PAQ + \lfloor PBQ = 180^0$ (D) $\lfloor PAB = 50^0$

16) A spherical glass vessel has (with lid) a cylindrical neck 7cm long, 1.6cm diameter, the diameter of the spherical part is 8.4cm. Then

(A) volume of the vessel is $324.544 cm^3$

(B) surface area of the vessel (without lid) is 256.96 cm^2

(C) surface area of the vessel is $256 cm^2$

(D) volume of the vessel is $320.5 cm^3$

17) In the given diagram ABCE is a isosceles triangular based pyramid $AB = AC = 13cm$, $BC = 10cm$ And the volume of the pyramid is $350cm^3$. F is centroid of $\triangle ABC$. Then
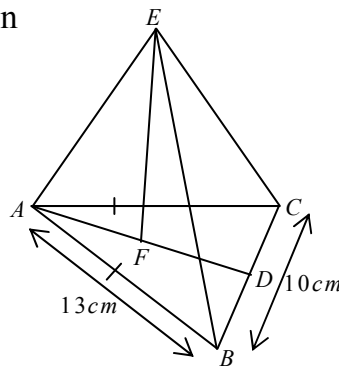
(A) height of the pyramid is 15 cm   (B) height of the pyramid is 17.5cm

(C) Area of $\triangle BFC$ 20 sq. cm   (D) $AF = 8cm$

18) The value of $\dfrac{5}{\left(3^{\frac{2}{3}} - 6^{\frac{1}{3}} + 2^{\frac{2}{3}}\right)} - \dfrac{2}{\left(3^{\frac{2}{3}} + 3^{\frac{1}{3}} + 1\right)} - \dfrac{1}{\left(2^{\frac{2}{3}} + 2^{\frac{1}{3}} + 1\right)}$

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

19) $\log_{10} 2 = a$ and $\log_{10} 3 = b$ then

(A) $\log_{10}\left(\dfrac{4}{27}\right) = 2a - 3b$ (B) $\log_{10} 45 = 1 + 2b - a$

(C) $\log_{10}\left(\dfrac{27}{4}\right) = 2a - b$ (D) $\log_{10} \dfrac{225}{16} = 2 - 6a - 2b$

20) A distribution table is given as follows

| Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	20	x	40	y	25	15

The median is 35, and the sum of all the frequencies is 170. Then

(A) $x = 35$ (B) $y = 35$ (C) $x = 25$ (D) $y = 25$

21) If $x^4 - 4x^3 + 6x^2 + ax + b$ is a perfect square and its square root is $\left(x^2 + kx + 1\right)$ then

    (A) $a = -4$ (B) $b = 1$

    (C) $k = 2$ (D) square root of $\left(x^2 + kx + 1\right)$ is $\left(x - 1\right)$

22) Number of elements in set A is 5, P and Q are subsets of A. Then

    (A) if only one element is common in P and Q then the number of pairs of subsets P and Q is 80

    (B) if four elements are common in P and Q then the number of pairs of subsets P and Q is 15

    (C) if P and Q are disjoint sets then the number of pairs of subsets P and Q is 32

    (D) if P and Q are disjoint and $P \cup Q = A$ the number of pairs of subsets P and Q is 32

23) In the given figure $R = 15cm, r = 5cm, H = 21cm$ then $\left(\pi = \dfrac{22}{7}\right)$
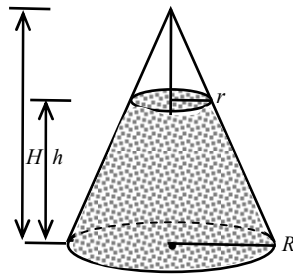
    (A) The volume of the shaded part $4433\dfrac{1}{3}cu.cm$

    (B) $h = 14cm$

    (C) Area of the base $707\dfrac{1}{7}sq.cm$

    (D) Area of the base $4530\dfrac{1}{3}sq.cm$

24) In the given diagram ABCD is a parallelogram. E and F are mid points of BC and CD respectively. Then which of the following statement (S) is / are true.
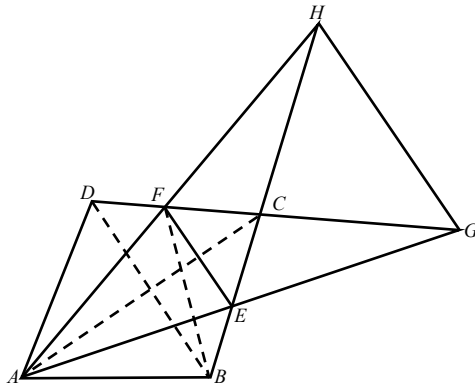
(A) Area of $\triangle AFB = \dfrac{1}{2} \cdot$ Area of parallelogram ABCD

(B) Area of $\triangle AGH =$ Area of parallelogram ABCD

(C) Area of $\triangle AGH = \dfrac{3}{2} \cdot$ Area of parallelogram ABCD

(D) $EF = \dfrac{1}{2} GH$

25) Length of canvas is 'x' m and width is 2 m. If a conical tent of 8 m diameter and 5.6 m slant height is made then

(A) $x = 35.2 m$

(B) its volume is $\dfrac{2816\sqrt{6}}{105} m^3$

(C) height of tent $\square \dfrac{8\sqrt{6}}{5} m$

(D) its volume is $\dfrac{2810\sqrt{6}}{105} m^3$

PHYSICS

26)   When a light ray gets reflected from a plane surface

(A). angles of reflection and incidence are not equal

(B) incident, reflected rays and normal to the surface lie in same plane

(C) angles of reflection and incidence are equal

(D) the incident ray and normal to the surface lie in one plane while reflected ray will be in different plane

27)   An object is placed in front of a concave mirror on its axis. When light get reflected from mirror

(A)   the ray travelling parallel to axis passes through focal point after reflection

(B)   the ray passing through focal point travels back after reflection

(C) the ray passing through centre of curvature travels back after reflection

(D) if the object is at the centre of curvature of the mirror an inverted image will be formed at the object itself

28)   When a light ray gets refracted from one medium to another medium then

(A)   If light ray travels from rarer medium to denser medium then the refracted ray moves away from the normal to the surface

(B)   refraction is due to change in speed of light in the two media

(C) the speed of light ray will be low in the medium whose refractive index is high

(D) the ratio of speeds of light in the two media is equal to reverse ratio of respective refractive indices

29) When a light ray from an denser medium is incident on surface of rarer medium, then

(A) if the angle of incidence is more than critical angle, the ray gets reflected into denser medium

(B) if the critical angle of two media is 45° the maximum possible deviation of the ray will be 90°

(C) if the critical angle of two media is 60° the maximum possible deviation of the ray will be 60°

(D) if the relative refractive index of denser medium is 2, the critical angle is $Sin^{-1}(0.5)$

30) A transparent sphere of radius 'R' and refractive index 'n' is kept in air. If a point object is placed at distance 'x' from the surface a real image is formed exactly at distance 'x' from other surface. The value of 'x' is

(A) $\dfrac{R}{(n+1)}$ (B) $\dfrac{R}{(n-1)}$ (C) R(n-1)   (D) R(n+1)

31) A convex lens is used to form the image of an object. The center of curvature of the lens is 'C' and its focal point is 'F'

(A) When object is placed at C a real image of same size will be formed.

(B) When object is placed between C, and F, a virtual and magnified image will be formed.

(C) When object is placed at F, image will be formed at infinite distance away from lens

(D) When object is placed at F, a virtual image will be formed at infinite distance from lens.

32) A convex lens of focal length 21 cm is placed between the object and screen. The distance between the object and screen is 1 m. The position of the lens from object to get sharp images is

(A) 100 cm   (B) 70 cm   (C) 30 cm   (D) 21 cm

33) In a certain time interval light travels 3.5 Km in vacuum and 2.5 Km in a medium.

Select the **correct** choice(s) from the following.

(A) The medium is a rarer medium

(B) The refractive index of the medium is 1.4

(C) The medium is a denser medium

(D) The refractive index of the medium is 0.7

34) Read the following three statements and select the correct choice (s)

(I) Convex lens acts as converging lens when placed in a medium of less refractive index than its refractive index.

(II) Convex lens always acts as converging lens irrespective of the medium in which it is placed.

(III) Convex lens acts as diverging lens when placed in a medium of higher

refractive index than its refractive index.

(A)   All the three statements are correct

(B)   Statements I is correct, II and III are not correct

(C)   Only Statement I is correct

(D)   Statements I, III are correct and II is wrong

35) In case of functioning of human eye, select **wrong** choice (s) from flowing statements.

(A)   Ciliary is a nerve which helps eye-lens to change its focal length

(B)   When eye is focused on distance object, the ciliary part of eye adjust the

focal length of eye-lens to its maximum value.

(C)   When eye is focused on distance object, the focal length of eye-lens is

more than the distance of object from retina.

(D)   'Rods' of retina helps eye to identify the intensity of light.

36) A prism of refractive index 'n', has angle 'A' and it produces minimum deviation

'D'. Then select the **correct** choice (s)

(A)   The angle between the incident and emergent rays is angle of incidence.

(B)   The angle of emergence is equal to angle of incidence only at minimum

deviation.

(C)   In minimum deviation position of prism, the angle of refraction is equal to

half of the angle of prism.

(D)   The refractive index of prism material is equal to $\sqrt{3}$

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37) If a prism of angle 60^0 produces minimum deviation equal to half of its angle, then the refractive index of the prism is

(A) 1.5   (B) $\sqrt{3}$ (C) 1.4   (D) $\sqrt{2}$

38) Read the statements given below and select the **correct choice (s)**

When visible light, travelling in a medium

(I) Red color has highest wave length

(II) Violet color has highest wave length

(III) the medium has low refractive index for red colour light

(IV) the medium has large refractive index for violet colour light

(A) Statements I, II and III are correct

(B) Statements I, III and IV are wrong

(C) Statements I, III and IV are correct

(D) Statements I, II and IV are wrong

39) A ray of light incident on one of the refracting surfaces of an equilateral glass prism placed on horizontal table undergo minimum deviation. Considering the paths of the incident, refracted and emergent rays, select the **correct choice** (s).

(A) The refracted ray will be parallel to the base of prism.

(B) The emergent ray will be parallel to the base of prism.

(C) The emergent ray and refracted rays will be parallel to the base of prism.

(D) The incident and emergent rays will make equal angles with respect base of the prism.

40) The relation between the wave length and frequency of a light wave is as follows

(A) The wave length is proportional to frequency

(B) The wave length is inversely proportional to frequency

(C) The wave length is proportional to square of frequency

(D) The product of wave length and frequency will be equal to speed of the light ray

41) Select the **correct choice (s)** from the following.

(A) Specific heat is the thermal capacity of the material of the body

(B) Specific heat is the ratio of amount of heat required to rise temperature of certain mass of substance through 1^0C to the amount of heat required to raise the temperature of same amount of water through 1^0C

(C) Specific heat of a substance is the amount of heat required to rise the temperature of 1gm of the substance through 1^0C

(D) The thermal energy will be measured in Calorie

42) Two spheres 'A' and 'B' are made of different materials. Their diameters are in ratio 1:2, densities in ratio 1:4 and specific heats in ratio 1:2. If the mass of sphere 'A' is 10 gm and its specific heat is 0.4 cal/gm/^{o}C, then

(A) the thermal capacity of sphere 'A' is 4 cal.

(B) the thermal capacity of sphere 'B' is 256 cal.

(C) the ratio of thermal capacities of spheres 'B' and 'A' is 64:1

(D) the ratio of thermal capacities of spheres 'B' and 'A' is 1:32

43) Among the following choose the **correct choice** (s)

(A) Mechanical waves can travel through vacuum.

(B) Sound waves are propagated as longitudinal waves.

(C) Velocity of sound waves is constant, irrespective of medium in which they travel.

(D) Sound waves are propagated as transverse waves.

44) Sound waves produce 'crests' and 'troughs' in the medium they travel. If 1000 waves cross a point in the medium in 4 sec time and distance between a crest and adjacent through is 25 cm, then

(A) Wave length of sound wave is 100 cm.

(B) Frequency of sound wave is 4000 Hz

(C) The velocity of sound wave is 25×10^3 cm/sec

(D) The velocity of sound wave is 4×10^3 cm/sec

45) The specific resistance of the material of a wire is 'ρ' and its volume is 3 m^3 and resistance is 3Ω . The length of the wire will be

(A) $\sqrt{1/\rho}$ (B) $3/\sqrt{\rho}$ (C) $\sqrt{3}/\rho$ (D) $\rho/\sqrt{3}$

46) A wire of resistance 7 Ω is connected in parallel with a wire of 9 Ω. This combination is connected to a battery. Then

(A) The same current passes through each wire.

(B) The voltage across each wire is same.

(C) Power dissipation is more in 7 Ω resistance wire compared to 9 Ω wire

(D) Power dissipation is more in 9 Ω resistance wire compared to 7 Ω wire

47) Two wires each having 4 ohm resistances are connected in parallel and this combination is connected in series with a wire of resistance of 2 ohm. If this circuit is connected to a battery of 6 volts, then

(A) the effective resistance of the circuit is 10 ohm.

(B) the effective resistance of the circuit is 4 ohm.

(C) the current flowing in 2 ohm resistance is 1.5 amp.

(D) the power dissipated in the circuit is 9 watt.

48) Two particles 'P' and 'Q' having their charges in ration 1:2 and masses in ratio 1:4 moving with same velocity 1.6×10^6 m/sec enter perpendicularly in to uniform magnetic field of induction 1.6×10^{-4} Weber /m^2. If the charge of particle 'P' is 1.6×10^{-19} C and mass is 3.2×10^{-31} kg, then

(A) the radius of path of particle 'P' is 0.2 m.

(B) the radius of path of particle 'P' is 0.02 m.

(C) the radius of path of particle 'Q' is 0.4 m.

(D) the radius of path of particle 'Q' is 0.04 m.

49) The letter "A" is constructed with 5 pieces R_1, R_2, R_3, R_4 and R_5 each of 10 cm long and having resistance 1 ohm per cm and the free ends are connected to a battery of 10 volts as shown in figure.
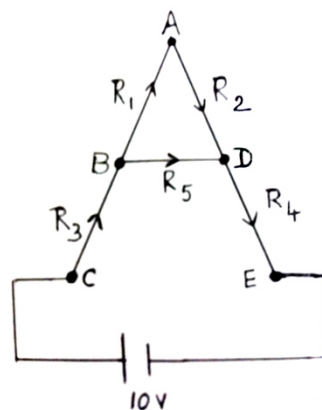
(A) The current flowing in resistance R_1 is 1/5 of current in resistance R_4

(B) The current flowing in resistance R_3 is 1/4 of current in resistance R_2

(C) The current flowing in resistance R_2 is 1/3 of current in resistance R_4

(D) The current flowing in resistance R_5 is 1/4 Amp.

50) If the electron which is in first excited state of hydrogen atom acquires an additional energy of 2.86 eV, then

(A) the energy of initial state of electron is - 6.26 eV

(B) the quantum number of final state of electron is 2

(C) the energy of initial state of electron is - 3.4 eV

(D) the quantum number of final state of electron is 5

CHEMISTRY

51) Choose the **correct** process occurring during chemical change:

(A) Products may be formed with different physical states

(B) Gases will never be liberated

(C) The original substance will lose their characteristic property

(D) Insoluble substances may be formed

52) Chemical equation will provide the following information:

(A) colour   (B) heat changes

(C) precipitate formed   (D) balanced equation

53) Calculate the mass (gm) of Hydrogen molecules liberated when 92gm of Sodium reacts with excess of water at STP.

(A) 2   (B) 4   (C) 6   (D) 10

54) Which of the following are the types of chemical reactions?

(A) decomposition   (B) displacement

(C) corrosion   (D) oxidation-reduction

55) The number of moles of oxygen liberated on decomposition of $KClO_3$ is

(A) 6   (B) 1   (C) 2   (D) 3

56) Which of the following reactions will evolve hydrogen gas?

(A) Electrolysis of aq. NaCl   (B) NaOH with Zn

(C) NaCl with H_2SO_4 (D) Zn with HCl

57) Which of the following solutions are acidic in nature?

(A) orange juice   (B) blood

(C) coffee   (D) rain water

58) Choose the correct statement(s) of the following regarding pH:

   (A) The pH of salts of a strong acid and a strong base is less than 7

   (B) The pH of salts of strong acid and weak base is more than 7

   (C) The pH of salts of weak acid and weak base depends on relative strengths of acid and base

   (D) The pH of salts of strong base and weak acid is less than 7

59) Which of the following statements is (are) **correct** regarding $NaHCO_3$?

   (A) mild antiseptic   (B) neutralize an acid

   (C) added for fast cooking   (D) added to make soft bread

60) Match the following:

   a) Gypsum   1) aq. NaCl

   b) Bleaching powder   2) Na_2CO_3

   c) Brine   3) $CaSO_4 . \frac{1}{2} H_2O$

   d) Washing soda   4) $CaOCl_2$

                                5) $CaSO_4 . 2H_2O$

	a	b	c	d
A)	3	4	1	2
B)	3	4	2	5
C)	5	2	4	1
D)	5	4	1	2

61) Choose the **correct** statement(s) regarding electromagnetic radiation:

   (A) Higher energy corresponds to higher wavelength

   (B) Always need medium for travelling

   (C) The energy is emitted in quanta (multiples of hv)

   (D) Can travel through vacuum

62) The flame colours produced by Sodium chloride, Strontium chloride and Cupric chloride respectively are:

   (A) Yellow, apple green and blue   (B) yellow, crimson red and green

   (C) blue, lavender and green   (D) orange, green and brick red

63) The total number of m_l values for 4f subshell is

   (A) 3   (B) 5   (C) 7   (D) 9

64) The electronic configuration of sulphur is:

   (A) $1s^2 2s^2 2p^6 3s^2 3p^4$ (B) $1s^2 2s^2 3s^2 2p^6 3p^6$

   (C) $1s^2 2s^2 2p^6 3s^2 3p^6$ (D) $1s^2 2s^2 2p^6 3s^2 3p^2$

65) Which of the following elements obey Dobereiner's law of Triads

   (A) calcium, strontium, barium   (B) chlorine, bromine, iodine

   (C) fluorine, chlorine, bromine   (D) lithium, sodium, potassium

66) Choose the **correct** statement(s) regarding Mendaleeff's periodic table:

   (A) There are eight vertical columns

   (B) Elements in each period resemble in their properties

   (C) Blank spaces are left for missing elements

   (D) There are nine periods in the table

67) Choose the **correct** combination(s) of the following:

   (A) Radium – Nobel gas   (B) Tellurium – Chalcogen

   (C) Cesium – Alkaline earth metal   (D) Austatine – Halogen

68) Which of the following elements is (are) **not** lanthanides?

   (A) Gadalinium   (B) Rutherfordium

   (C) Dysprosium   (D) Darmstadium

69) Choose the **correct** statement(s) of the following regarding periodic properties:

   (A) onization energy decreases from top to bottom in a group

   (B) Atomic radii increase across a period from left to right

   (C) Atomic radii increase from top to bottom in a group

   (D) Physical and chemical properties of elements are related to their atomic weights

70) Choose the metal combinations from the following:

   (A) Aluminium, phosphorous, silicon   (B) sodium, magnesium, chromium

   (C) carbon, germanium, lead   (D) manganese, copper, nickel

71) Which of the following has eight valence elections?

   (A) Ne   (B) Na^+ (C) O^{2-} (D) Mg^{2+}

72) Which of the following is correct regarding electro affinity?

   (A) $F > Cl$ and $O < S$ (B) $Br > I$ and $S > O$

   (C) $Cl > F$ and $S > O$ (D) $O > S$ and $F > Cl$

73) Which of the following molecules exhibit sp^3 hybridization?

   (A) CH_4 (B) H_2O (C) BF_3 (D) NH_3

74) An example for polar covalent bonded compound is

   (A) NaCl   (B) $MgCl_2$ (C) C_2H_4 (D) HCl

75) Which of the following is (are) stable electronic configurations:

   (A) $1s^2 2s^2 2p^4$ (B) $1s^2 2s^2 2p^3$ (C) $1s^2 2s^2 2p^6 3s^2$ (D) $1s^2 2s^2 2p^6$

BIOLOGY

76) Which of the following statements are true regarding energy releasing system of Homo sapiens?

   (A) Concentration of O_2 is high in lungs than capillaries

   (B) Carries O_2 from alveoli to blood cells

   (C) Concentration of O_2 is high in capillaries than lungs

   (D) Carries CO_2 from alveoli to blood cells

77) Which of the following invertebrates have common cavity for digestion and transportation of nutrients?

   (A) Jelly fish   (B) Sycon   (C) Hydra   (D). Sponges

78) In Universal food providers body mass is increased by

   (A) O_2 (B) CO_2 (C) CH_2O (D) H_2O

79) Inherted hemoglobin deficiency disorder causes

   (A) Low thrombokinase   (B) Liver enlargement

   (C) Hemoglobin protein is normal   (D) Prone to infections

80) Dodder has the following characters

   (A) Absorbs water through roots   (B) Absorbs water through haustoria

   (C) Do not produce flowers   (D) Leaves are reduced

81) Choose the correct process in human's digestive system

   (A) Mastication → Digestion → Emulsification → Absorption

   (B) Mastication → Emulsification → Digestion → Absorption

(C) Digestion → Mastication → Absorption → Defecation

(D) Digestion → Emulsification → Absorption → Defecation

82) People become anemic due to the following deficiency

(A) vitamin B_3 deficiency

(B) Folic acid deficiency

(C) vitamin B_{12} deficiency

(D) vitamin B_6 deficiency

83) Mechanisms involved in urine formation are

(A) Glomerulus receives blood from an efferent arteriole

(B) Secretion of salt ions into PCT from DCT

(C) Reabsorption of substances into PCT

(D) Glomerulus receives blood from an afferent arteriole

84) Choose the **correct** pairs from below

(A) Movement of urine – Peristalsis

(B) Movement of water within the plant – Diffusion

(C) Gaseous exchange in lungs – Diffusion

(D) Entry of water into plant through roots – Filtration

85) Secondary metabolites used as an insecticide either from leaves or flowers of the following plants

(A) Nicotiana tabacum

(B) Datura

(C) Chrysanthemum

(D) Cinchona officinalis

86) Which of the following functions of the parts of the brain are true?

(A) Voluntary activities are coordinated by cerebrum

(B) Voluntary activities are coordinated by Autonomous nervous system

(C) Master gland is controlled by hypothalamus

(D) Diencephalon is a centre for muscular activities

87) Choose the correct pair of endocrine glands and their responses

(A) Pituitary gland – ovulation

(B) Thyroid gland – growth rate

(C) Pancreas gland – dilation of pupil

(D) Adrenal gland–stimulates vasopressin

88) Which of the following plants propagate naturally by root?

(A) Ginger

B) Onion

C) Radish

D) Carrot

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89) Passage of spermatozoa in human generating system

(A) Vasa deferentia – Vasa efferentia – Urethra

(B) Vasa efferentia – Vasa deferentia – Urethra

(C) Seminiferous tubules – Epididymis – Ejaculatory duct

(D) Epididymis - Seminiferous tubules – Ejaculatory duct

90) Which of the following changes occur during Prophase of Mitosis?

(A) Splitting of centromeres

(B) Separation of chromatids

(C) Formation of chromatids

(D) Disappearance of nuclear membrane

91) Choose the **correct** combinations of scientist, their study and year of study

(A) Lavoisier – coined the term oxygen – 1775

(B) Lavoisier – discovered oxygen – 1774

(C) Priestly – discovered oxygen – 1774

(D) Caventou – named chlorophyll – 1817

92) What are the roles played by an epiglottis during breathing or swallowing

(A) Opens widely while taking air

(B) Partly closed while taking air

(C) Opens widely while taking food

(D) Opens partly while taking food

93) Theory of Natural Selection explains

(A) Struggle for existence

(B) Traits not used are going to be perished

(C) In a population organisms do not develop variations

(D) Organisms do not adapt to new environment

94) Out of 440 pea seeds produced in F_2 generation of Mendel experiment, how many seeds are green and yellow?

(A) Green seeds – 330

(B) Yellow seeds – 110

(C) Yellow seeds – 330

(D) Green seeds – 110

95) The finger like projections in small intestine

(A) Enhances absorption of nutrients

(B) Absorbs nutrients by the coordination of second brain

(C) Absorption of nutrients depends on the coordination of CNS

(D) Absorbs nutrients without the influence of enteric nervous system

96) Identify the facts about Ghrelin

(A) It is secreted by pancreatic gland

(B) Increases sensation of hunger

(C) Suppresses hunger

(D) It is a protein

97) The response of plants in Thigmotropism

(A) Growth of tendrils towards support

(B) Found in stem of cucumber

(C) Not observed in climbers

(D) Helps in growth of pollen tube

98) Transportation of mineral salts in plants occurs by

(A) The diffusion into the root hairs

(B) The utilization of energy in cytoplasm during diffusion

(C) The lateral passage from phloem to xylem in the vascular tissue

(D) The movement along with water

99) Events that occur during Photochemical phase in autotrophs
(A) Formation of hydrogen and hydroxyl ions

(B) Splitting of water molecule is independent of energy

(C) Glucose is produced

(D) Oxygen is released from CO_2

100) Each nucleus in pollen tube of angiospermic plant fuses with

(A) Fusion nucleus   (B) Antipodal cells

(C) Synergids   (D) Egg cell

-END-

The Council

The aim of school education is reduced to one of obtaining good marks, leading to over-emphasis on bookish knowledge. It was felt that an independent voluntary organisation could provide suitable direction to enthusiastic and talented students. Thus, a non-profit voluntary society under title "Dr A S Rao Awards Council" was founded in 1988(registered in 1989) in the name of first MD of ECIL Hyderabad. The aims of the council are (i) to spot and nurture talented students, and (ii) to promote excellence in teaching science and mathematics.

STSE

The Council conducts a unique yearly Science Talent Search Examination (STSE) to spot talent in high school students. As part of nurturing the talented students, the Council organises a week long Residential Science Workshop (RSW) for the awardees of 9th standard, *free of cost* to the participants, in April-May. Each participant does project work, writes a report and makes an oral presentation. This helps the participants develop initiative, to innovate and to critically analyse the experimental data. Participants are exposed to lectures-demonstrations on diverse topics by senior faculty drawn from Universities and committed educational institutions.

CETSAM

The Council recognised the great need to help science teachers from schools in rural and semi-urban areas to cope up with the upgraded syllabi. The Council focused its efforts through CETSAM (Capacity Enhancement of Teachers in Science And Mathematics) to help physical science and mathematics teachers of govt schools in Mahaboobnagar District with active cooperation of the erstwhile Govt of Andhra Pradesh. Sir Ratan Tata Trust funded this project (2005-09). In July 2014, the Council on its own organised and conducted a similar 2-day CETSAM in Bhimavaram.

Significance of Dr A S RAo

Ayyagari Sambasiva Rao (1914-2003), was the founding Managing Director of Electronics Corporation of India Limited, Hyderabad.

Born in a poor family, Shri Rao evolved into a man of simplicity and humility, with a fine human touch. He is recognised as a man, not merely of strong beliefs, but of action in the philosophy of technological self-reliance.

Shri Rao was a physicist by training, but studied later Electrical Engineering in Stanford University. He was associated with Dr Homi Bhabha, the well-known nuclear scientist. Shri Rao helped build our country's first atomic reactor, *Apsara*, based on 'self-reliance'. Shri Rao was closely involved in formulating policies for development of electronics in the country.

Shri Rao was conferred Honorary Doctorate by Andhra University. Shri Rao was also recipient of *Padamasri* and *Padma Bhushan* awards.