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EXAMINATION (PHASE-I)

RPSOLYMPIAD-2022

CLASS-10th

M.M. 70   **Class-10th**   **Time:70 minutes**

English (10)

Find the error parts (if possible) in question 1, 2 :-

1. He is a university professor(1)/but of his three sons (2)/neither has any merit.(3)/ No error(4)
   a) 1   b) 2   c) 3   d) 4

2. It is time for you (1)/decide on your next (2) of action.(3)No error(4)
   a) 1   b) 2   c) 3   d) 4

3. He is so weak *that he cannot stand*. *(IDENTIFY THE CLAUSE)*
   a) Noun Clause   b) Adverb Clause   c) Adjective Clause   d) none of these

(4-10)Choose the most appropriate option:

4. They heard the child cry (Change into passive voice)
   a) The child was heard to cry.
   b) The child is heard to cry.
   c) The child cry is to be heard.
   d) The child cry is heard by them.

5. If I were the Prime Minister, I _____remove poverty from India.
   a) Would have   b) could   c) would   d) will

6. Adrian as well as his parents _____ arrived.
   a) has   b) have   c) are   d) were

7. Since he is ill, she is confined _____ bed.
   a) in   b) on   c) to   d) of

8. No sooner had he returned_____ he was off again.
   a) When   b) that   c) than   d) then

9. He said to me,"We are mortal." (Change into indirect speech)
   a) He told me that he was mortal.
   b) He told me that we are mortal.
   c) He told me that they are mortal.
   d) He told me that we were mortal.

10. " Hit the sack" means
    a) something complicated   b) something very easy

    c) go to sleep   d) none of these

Mathematics (20)

11. One side of a parallelogram is **12cm** and its area is **60 cm²**. If the angle between the adjacent sides is **30°**, then its other side is

    (a) $8cm$ (b) $6 \, cm$ (c) $10 \, cm$ (d) $4 \, cm$

12. If three points $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ lie on the same line, then
    $\dfrac{y_2 - y_3}{x_2 x_3} + \dfrac{y_3 - y_1}{x_3 x_1} + \dfrac{y_1 - y_2}{x_1 x_2}$ is equal to

    (a) 1   (b) -1   (c) 0   (d) 2

13. AB and CD are two chords of a circle such that $= 8cm$, $CD = 10cm$ and $AB \parallel CD$. If the perpendicular distance between AB and CD is 2 cm, then what is the radius of the circle equal to?

    (a) $\dfrac{5\sqrt{17}}{4} \, cm$ (b) $\dfrac{4\sqrt{17}}{5} \, cm$ (c) $\dfrac{3\sqrt{17}}{5} \, cm$ (d) $\sqrt{17} \, cm$

14. If length, breadth and height of cuboid is increased by X%, Y% and Z% respectively then its volume is increased by

    (a) $\left[x + y + z + \dfrac{xy + xz + yz}{100} + \dfrac{xyz}{(100)^2} \right] \%$ (b) $\left[x + y + z + \dfrac{xy + xz + yz}{100} \right] \%$

    (c) $\left[x + y + z + \dfrac{xyz}{(100)^2} \right] \%$ (d) none of these

15. Find the volume of the greatest right circular cone, which can be cut from a cube of a side $4 \, cm$ $(in \, cm^3)$

    (a) $\dfrac{12\pi}{5}$ (b) $\dfrac{20\pi}{3}$ (c) $\dfrac{18\pi}{3}$ (d) $\dfrac{16\pi}{3}$

16. A number x is selected from the number 1, 2 and 3 and then a second number y is randomly selected from the numbers 1, 4 and 9. What is the probability that the product xy of the two numbers will be less than 9?

    (a) $\dfrac{5}{9}$ (b) $\dfrac{9}{10}$ (c) $\dfrac{2}{9}$ (d) $\dfrac{7}{10}$

17. A cake of $6cm$ radius is divided into 3 sectors with central angles $120°, 150°$ and $90°$ respectively. The ratio of the areas of three sectors is ......
    (a) $4 : 3 : 5$ (b) $5 : 3 : 4$ (c) $3 : 4 : 5$ (d) $4 : 5 : 3$

18. One root is square of the other root of the equation $x^2 + px + q = 0$, then the relation between p and q is
    (a) $p^3 - q(3p - 1) + q^2 = 0$ (b) $p^3 - q(3p + 1) + q^2 = 0$
    (c) $p^3 + q(3p - 1) + q^2 = 0$ (d) $p^3 + q(3p + 1) + q^2 = 0$

19. If α, β, γ are the roots of the equation $2x^3 - 3x^2 + 6x + 1 = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to

    (a) $\frac{-15}{4}$ (b) $\frac{15}{4}$ (c) $\frac{9}{4}$ (d) 4

20. $\sqrt{m^4 n^4} \times \sqrt[6]{m^2 n^2} \times \sqrt[3]{m^2 n^2} = (mn)^k$, then find the value of k.

    (a) 6   (b) 3   (c) 2   (d) 1

21. If $sin^2\theta + cosec^2\theta = 6$, then the value of $sin\theta + cosec\,\theta$= ....

    (a) $3\sqrt{2}$ (b) $2\sqrt{2}$ (c) $4\sqrt{2}$ (d) $\sqrt{2}$

22. What is the value of $sin^2 0° + sin^2 1° + sin^2 2° + \cdots \ldots \ldots \ldots . + sin^2 90°$?

    (a) 0   (b) 45   (c) $\frac{89}{2}$ (d) $\frac{91}{2}$

23. If $a\cos\theta - b\sin\theta = c$, then $a\sin\theta + b\cos\theta =$

    (a) $\pm\sqrt{a^2 + b^2 + c^2}$ (b) $\pm\sqrt{a^2 + b^2 - c^2}$

    (c) $\pm\sqrt{c^2 - a^2 - b^2}$ (d) none of these

24. In the following figure O is the centre of circle and $\angle BAC = n°$, $\angle OCB = m°$ then
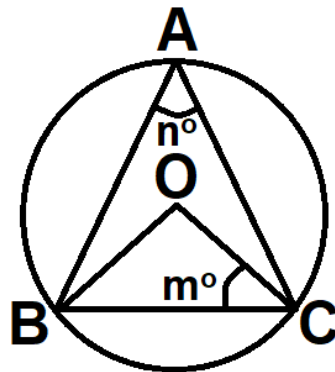
    (a) $m° + n° = 90°$ (b) $m° + n° = 180°$ (c) $m° + n° = 120°$ (d) $m° + n° = 150°$

25. In a frequency distribution median is $\frac{11}{10}$ times the mean, and mode is 5.2. Find the median.

    (a) 4.4   (b) 4.3   (c) 4.1   (d) 4.0

26. The mean of n numbers is M. If 1 is added to the first number, 2 is added to second number, n is added to the nth number then the new mean is

    (a) $M + n$ (b) $M + \frac{n}{2}$ (c) $M + \frac{n+1}{2}$ (d) none of these

27. Two fair dice are rolled together. The probability that the difference of numbers appearing is 1 will be

    (a) $\frac{5}{6}$ (b) $\frac{7}{36}$ (c) $\frac{5}{18}$ (d) $\frac{7}{14}$

28. If a, b, c, d, e, f are arithmetic mean between 2 and 12, then $a + b + c + d + e + f$ is equal to
    (a) 14   (b) 42   (c) 84   (d) none of these

29. If a, b, c, d, e, f are in AP then $e - c$ is equal to
    (a) $2(c - d)$ (b) $2(d - c)$ (c) $2(f - d)$ (d) $2(d - c)$

30. ABC is an equilateral triangle ABC, the side BC is trisected at D then $9AD^2 =$
    (a) $7AC^2$ (b) $7AB^2$ (c) $8AC^2$ (d) $9AB^2$

Social Science (10)

31. Why was the tribal's chanting of Gandhiji's name and raising slogans demanding "Swatantra Bharat" important?

    (a) It showed the greatness of Mahatma Gandhi

    (b) They were going beyond their own locality and emotionally identifying with an all-India movement.

    (c) They were a unifying force of the Non-cooperation movement.

    (d) The various ways in which 'Swaraj' was interpreted by different people.

32. Two statements are given in the question below as Assertion

    (A) and Reason (R). Read the statements and choose the appropriate option:

    Assertion (A): Serfdom and bonded labour were abolished in Habsburg dominion and Russia.

    Reason (R):   Monarchs had realised that revolution could be resisted only by granting concessions to liberal-nationalist rebels.

    Options:

    (a) Both A and B are true and R is correct explanation of A.

    (b) Both A and B are true, but R is not the correct explanation.

    (c) A is true but R is false.

    (d) A is false but R is true.

33. "It is the best insulator and has resistance to high voltage and therefore is the most essential mineral used in electrical goods and electronic industry". Which mineral being talked of here?

    (a) Limestone   (b) Maganese   (c) Mica   (d) Bauxite

34. The Rourkela Steel plant was set up in collaboration with which country?

    (a) Russia   (b) France   (c) United Kingdom   (d) Germany

35. Arrange the following in the correct sequence:

    (i) Farmers decide to grow arhar and chickpea (pulse crops).

    (ii) Selling in the market.

    (iii) Setting up a dal mill to procure and process.

    (iv) Loan is taken from local bank to buy inputs.

    Options:

    (a) i-iv-iii-ii   (b) iii-iv-i-ii

    (c) iv-i-ii-iii   (d) iii-iv-ii-i

36. Banks facilitate digital transfer of money through………………

    (a) Credit cards   (b) Demand deposits   (c) Collateral   (d) Credit.

37. Match the items given in Column A to that Column B.

Column A	Column B
Basis	Resources
(A) Developed resource	(i) No appropriate technology for utilisation
(B) Stock	(ii) Not utilised
(C) Potential resource	(iii) Subset of the stock.
(D) Reserves	(iv) Resources surveyed in terms of quantity and quality.

    Choose the correct option:

    (a) A-i, B-iii, C-ii, D-iv   (b) A-iv, B-i, C-ii, D-iii

    (c) A-iii, B-i, C-iv, D-ii   (d) A-iv, B-ii, C-iii, D-i

38. Arrange political parties according to their formation dates in increasing order:

    (i) BSP   (ii) BJP   (iii) INC   (iv) CPI

    Options:

    (a) i-iv-iii-ii   (b) iii-iv-i-ii

    (c) iv-i-ii-iii   (d) iii-iv-ii-i

39. When we speak of gender divisions, we usually refer to:

    (a) Biological difference between men and women.

    (b) Unequal roles assigned by the society to men and women.

    (c) Unequal child sex ratio.

    (d) Absence of voting rights for women in democracies.

40. Which of the following is not a function of the community government in Belgium?

    (a) They help in community development.

    (b) They make economic and administrative laws for the Belgium government.

    (c) They talk about cultural, educational and language related issues.

    (d) They work to safeguard the interest of a particular community.

Aptitude (Reasoning) (10)

Direction: (41)

"START HER FOOD IN" is coded as "I#8 V#19 L@21 R@18".

"THE HUMAN MAKE PRODUCTION" is coded as "S#7 Z#19 P@14 L@11".

"HAIR RETURNED VICTORY SILENCE" is coded as "R@19 V@9 I#5 X#8".

41. What is the possible code for 'HANDSOME' in the given code language?

    A). N@19   B) M#8   C) N#19   D) M@8

42. The day before yesterday I was 25 and the next year, I turn 28. On what date did I give the statement.

    A) 1st January   B) 28th February   C) 31st December   D) 29th February

43. Complete the following series

    1, -8, 81, ?, 15625

    A) – 1022   B) – 1024   C) – 4094   D) – 4096

44. A watch gains 10 seconds in 3 minutes. It was set right at 9 A.M. In the evening of the same day, when the watch indicates half past 6'Oclock, the true time is

    A) 5 : 30 : 00 P.M.   B) 5 : 48 : 10 P.M.   C) 6 P.M.   D) 6 : 08 : 20 P.M.

45. The figure given below is prepared by some stick and provides and equation that is incorrect. How many minimum numbers of sticks must be removed from the left hand side to make it a correct equation?

    86+36+98=100

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

46. Find the value of # in the figure given below:
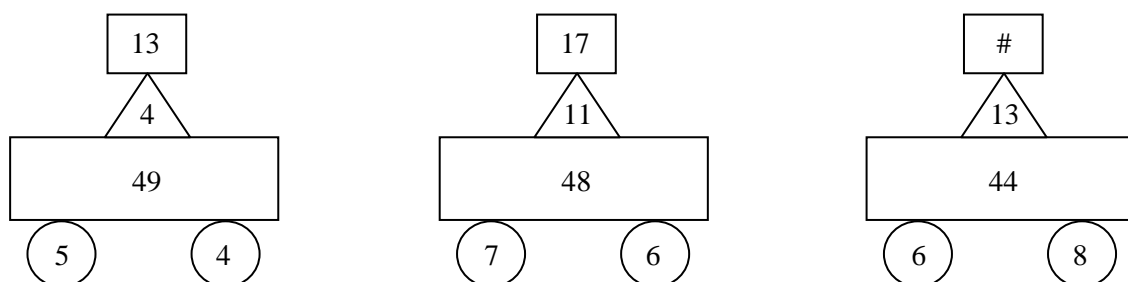
    A) 9   B) 15   C) 19   D) 21

47. One a staircase, Yaima is further up than Aloka but is lower than Sirinvas, Ranjan is in the middle. Jeet is between Yaima and Ranjan. Aloka is between Ranjan and Danial. There in one below Barisha. Who is in the fifth position?

    A) Aloka   B) Danial   C) Jeet   D) Yaima

Statement: (Question 48)

   Yatin and Anandi are a married couple with two children. Krishi and Kaniki. Kaniki is married to Samson who is the son of Nui and Nirmaan. Mishi is the daughter of Samson. Aliza, who is Samson's sister is married to Hatim and has two sons, Kuku and Kiki. Nui is the grandmother of Kiki. Krishi is the maternal aunt of Nishi.

48. What is the different between number of females and males in the generation to which Samson belongs?

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

49. Amla and Bimla stand in a line facing each other. Bimla's shadow falls to her right. If Bimla turned at 135^0 in anticlockwise direction with respect to her initial direction and Amla moves 135^0 in clockwise direction that she is already facing. What is new angle between the direction facing by them? [We are measuring angles at 9:00 am]

    A) 45^0 B) 135^0 C) 90^0 D) 0^0

Direction: (50) Study the information below and answer the following question.

   In a straight line facing North ; Manu, Naman, Omit, Praveen, Quinn, Raj and Sarla are sitting. Omit is 24 years old. One person sits between Omit and Naman. Quinn is immediate left of Naman and 15 years old. Two person sit between Manu and Naman. Naman is elder than Manu. Raj is elder than Praveen but younger than Sarla and Sarla is not 21 years old. [Assume ages in successive multiples of 3 from left to right]

50. Which of the following is true among the options?

    1) Praveen is younger than Quinn   2) Raj is younger than Naman

    3) Omit is second eldest   4) Manu is 9 years old

    A) Both 1) and 4) are true   B) 1), 3) and 4) are true

    C) None is true   D) All are true

Science (20)

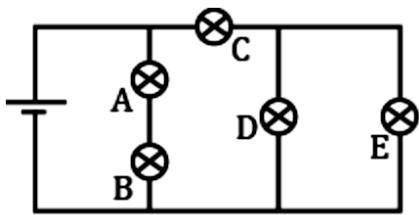## Physics (7)

51. In the diagram shown, all the wires have resistance R. The equivalent resistance between the upper and lower dots shown in the diagram is:
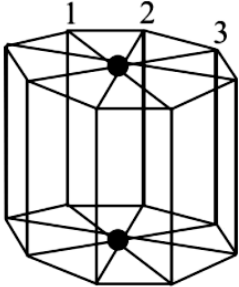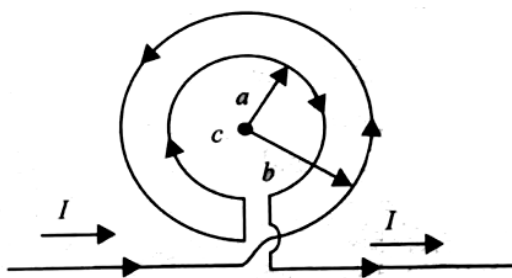

    a) R/8   b) R   c) 2R/5   d) 3R/8

52. The circuit below is made up using identical light bulbs. The light bulbs of maximum brightness of the following will be :
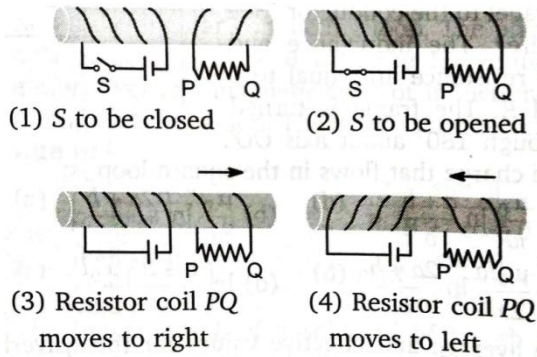

    a) A   b) C   c) D   d) E

53. An otherwise infinite, straight wire has two concentric loops of radii a and b carrying equal currents in opposite directions as shown in figure. The magnetic field at the common center is zero for :


    a) $\frac{a}{b} = \frac{\pi-1}{\pi}$ b) $\frac{a}{b} = \frac{\pi}{\pi+1}$ c) $\frac{a}{b} = \frac{\pi-1}{\pi+1}$ d) $\frac{a}{b} = \frac{\pi+1}{\pi-1}$

54. For each of the experiments (1, 2, 3, 4) shown in figure in what direction does current flow through the resistor PQ? Note that the wires are not always wrapped around the plastic tube in the same way.

(1) S to be closed   (2) S to be opened

(3) Resistor coil PQ moves to right   (4) Resistor coil PQ moves to left

|	(1)	(2)	(3)	(4)
a)	P to Q	P to Q	P to Q	P to Q
b)	P to Q	Q to P	P to Q	Q to P
C)	Q to P	Q to P	Q to P	Q to P
d)	Q to P	Q to P	P to Q	P to Q

55. A ray of light goes from point A in a medium where the speed of light is v_1 to a point B in a medium where the speed of light is v_2 as shown in the figure. The path of the rays in the two shown in figure.
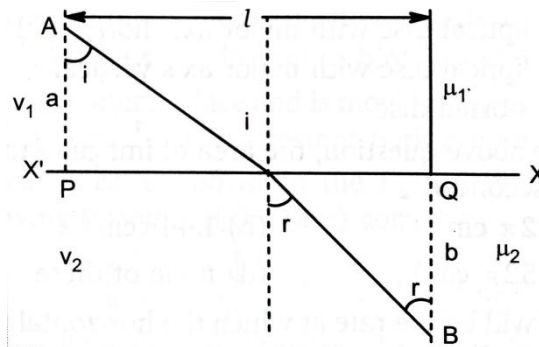

The time taken for the light to go from the point A to the point B in the figure is :

a) $\dfrac{a \sin i}{v_1}$ b) $\dfrac{b \sin r}{v_2}$ c) $\dfrac{v_2 a \sin i}{v_1 b \sin r}$ d) $\dfrac{a \sec i}{v_1} + \dfrac{b \sec r}{v_2}$

56. It is found that all electromagnetic signals sent from A towards B reach point C. The speed of electromagnetic signals in glass can not be :
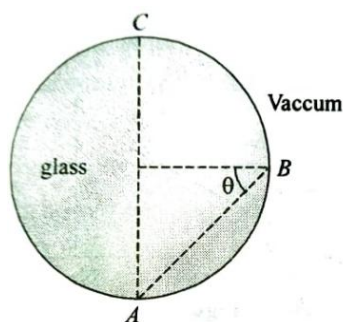
    a) 1.0×10^8 m/s   b) 2.4×10^8 m/s   c) 2×10^7 m/s   d) 4×10^7 m/s

57. Two identical conducting rings A & B of radius R are in pure rolling over a horizontal conducting plane with same speed of center of mass v but in opposite direction. A constant horizontal magnetic field B is exist in the space pointing inside the plane of paper. The potential difference between the topmost points of the two rings is :
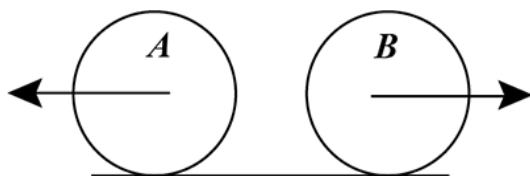
    a) Zero   b) 2BvR   c) 4BvR   d) None of these

Chemistry (7)

58. One mole of N_2H_4 loses 10 moles of electrons to form a new compound Y. Assuming that all the nitrogen appear in the new compound. What is the oxidation state of nitrogen in Y. (No change in the oxidation state of H)

    a) +1   b) –3   c) +3   d) +5

59. Which of the following statement is false.

    a) Elements of I B and II B groups are transition elements
    b) Elements of V B group do not contain metalloids.
    c) Elements of I A and II A groups are normal elements
    d) Elements of IV A groups are neither strongly electronegative nor strongly electropositive

60. Which is the set of amphiprotic species

    a) $H_3O^+, HPO_4^{2-}, HCO_3^-$ b) $H_2O, HPO_3^{2-}, H_2PO_2^-$

    c) $HSO_4^-, H_2PO_4^-, H_2PO_3^-$ d) All of these

61. Glycerol is added to soap. It functions

    a) as a filler   b) to prevent rapid drying

    c) to increase lathering   d) to make soap granules.

62. Number of OH^- in 1 mL solution of pH = 13 is :-

    a) 1×10^{13} b) 6.00×10^7 c) 6.02×10^{13} d) 6.02×10^{19}

63. A student named a certain compound as 2, 3–diethylbutane. Its correct IUPAC name is

    a) 3, 4 Dimethylhexane   b) 2, 3 Dimethylhexane

    c) 2 –Ethyl– 3 methylpentane   d) 3 – Ethyl–2 methylpentane

64. When PbO_2 reacts with concentrated HNO_3, the gas evolved is

    a) NO_2 b) O_2 c) N_2 d) N_2O

Biology (6)

65. The pyramid of number of individuals per unit area in grassland ecosystem will be

    a) erect   b) inverted   c) both (a) and (b)   d) none of the above

66. Which of the following association is correct?

    a) De Vries – Oenothera lamarkiana   b) Mendel – Mutations

    b) Darlington – DNA replication   d) Morgan – Father of genetics

67. Energy centre of sperm is

    a) head   b) middle piece   c) entire sperm   d) tail

68. Which is NOT essential for blood clotting?

    a) Ca^{++} ions   b) Fe^{++} ions   c) fibrinogen   d) platelets

69. Glyceraldehyde phosphate is oxidised during glycolysis. What happens to hydrogen atom and the electron that are removed during oxidation?

    a) they oxidise NAD^+;
    b) they are transferred to pyruvic acid;
    c) they are eliminated in the form of methane;
    d) they reduce NAD^+.

70. Progesterone is secreted by
    a) corpus allata   b) corpus albicans   c) corpus luteum   d) corpus callosum