IIT ASHRAM BRINGS...

CLASS **9**

PHASE-II

KHOJ (2021)

A Hunt for young Scientists..!

SAMPLE PAPER

Time : 1 Hours **Maximum Marks : 280**

IMPORTANT INSTRUCTIONS

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

A. GENERAL :

1. This booklet consists of 70 questions.
2. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine–readable Optical Mark Recognition (OMR), is provided separately.
4. Do not tamper with / mutilate the OMR or the Booklet.
5. Write Name and Address in capital letters on OMR sheet.
6. Submit the OMR Sheet back to Invigilator after examination before leaving the examination hall.
7. Previous year or Term exam's percentage | grade | Marks scored in Maths and Science must be written at the back of OMR Sheet

B. QUESTION PAPER FORMAT:

7. The question paper consists of **4 Parts.**

Part-I :- Mental Ability (14 Questions)
Part-II :- Mathematics (14 Questions)
Part-III :- Physics/ Chemistry (28 Questions)
Part-IV :- Biology (14 Questions)

C. Marking Scheme :

8. For each question in **Part-I , II, III & IV** you will be **awarded 4 marks** if you have darkened only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases where the answer marked is not correct, **minus one (–1) mark** will be awarded.

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PART – I : MENTAL ABILITY

1. Which one figure is related to figure III in the same way as figure I is related to figure II?

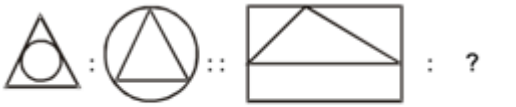
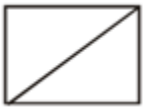


Fig : I Fig : II Fig : III Fig : IV

(a)  (b)  (c)  (d) 

2. Which one number can be placed at the sign of interrogation (?) in figure III so that it follows the operations of numbers in figure I and figures II?

Figure I Figure II Figure III

(a) 33 (b) 10 (c) 8 (d) 12

3. On January 12, 1980, it was Saturday. The day of the week on January 12, 1979 was-

(a) Saturday (b) Friday (c) Sunday (d) Thursday

4. If the word TRAIN is coded as WUDLQ, how the word BUS will be coded?

(a) EXU (b) DWU (c) EXV (d) VXE

5. If train is called bus, bus is called tractor, tractor is called car, car is called scooter, scooter is called bicycle and bicycle is called aeroplane then which is used to plough a field?

(a) Train (b) Bus (c) Car (d) Tractor

Directions (Qs. 6 and 7) Study the information given below and answer the questions that follow:

One a playground, Dinesh, Kunal, Nitin, Atul and Prashant are standing as described below facing the North.

(i) Kunal is 40 metre to the right of Atul

(ii) Dinesh is 60 metre to the South of Kunal

(iii) Nitin is 25 metre to the West of Atul

(iv) Prashant is 90 metre to the North of Dinesh

6. Who is to the North-East of the person who is to the left of Kunal?

(a) Dinesh (b) Nitin (c) Atul (d) Prashant

7. If a boy walks from Nitin, meets Atul followed by Kunal, Dinesh and then Prashant, how many metres has he walked if he has travelled the straight distance all through?

(a) 155m (b) 185m (c) 215m (d) 245m

8. If the word CLERK is coded as EOIWQ, how would you code the word TABLE?

(a) VCDNG (b) VCDGIN (c) VDFQK (d) VDFOK

9. Find the missing number :

1	4	?
64	9	16
49	36	25

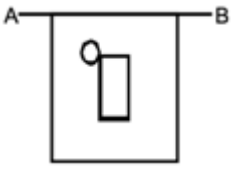
(a) 5 (b) 40 (c) 41 (d) 81

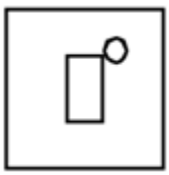
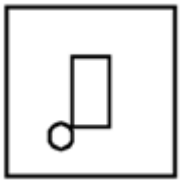
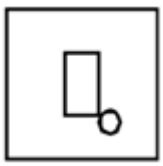
10. In the following question, complete the missing portion of the given pattern by selecting from the given alternatives (1), (2), (3) and (4).

(a)  (b)  (c)  (d) 

11. Which of the answer figure is exactly the mirror image of the given figure when the mirror is held at AB?

Given figure



(a)  (b)  (c)  (d) 

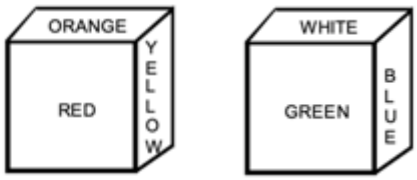
12. If 'ROSE' is coded as 6821, 'CHAIR' is coded as 73456 and 'PREACH' is coded as 961473, then what will be the code for 'SEARCH'?

(a) 246173 (b) 214673 (c) 214763 (d) 216473

13. In a certain code 'TRAIN' is written as GIZRM, how will FIGURE be written in that code?

(a) LSTGKV (b) VIYXTC (c) URIMV (d) VKGISV

14. Six sides of a cuboid block are coloured Green, Blue, Red, Yellow, Orange and White in the following manner:



When Blue is on the top, which colour will be at the bottom?

(a) Orange (b) Red (c) White (d) Yellow

PART – II : MATHEMATICS

1. If $a^p = b^q = c^r = abc$, then pqr = _____.

(a) $p^2q + q^2r$ V (b) $pq + qr + pr$ (c) $(pq + qr + rp)$ (d) $pq(qr + rp)$

2. If $\gamma = 3^{1/3} + 3$, then $\gamma^3 - 9\gamma^2 + 27\gamma$ = _____.

(a) 27 (b) - 27 (c) - 30 (d) 30

3. If $\sqrt{4x^4 + 12x^3 + 25x^2 + 24x + 16} = ax^2 + bx + c$, then which of the following is true?

(a) $2b = a - c$ (b) 2a = b + c (c) 2b = a + c (d) 2b = c − a

4. An examination consists of 160 questions. One mark is given for every correct option. If one-fourth mark is deducted for every wrong option and half mark is deducted for every question left, then one person scores 79. And if half mark is deducted for every wrong option and one-fourth mark is deducted for every left question, the person scores 76, then find the number of questions he attempted correctly.

(a) 80 (b) 100 (c) 120 (d) 140

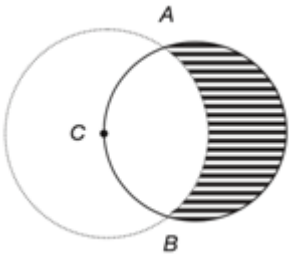
5. The mean of a set of 20 observations is 8 and another set of 30 observations is 10. The mean of combined set is _____.

(a) 9.2 (b) 10.8 (c) 11.2 (d) 9.8

6. x = ABCDEFGHIJ…Z.. Find the probability of a letter selected from those in odd positions of x being a vowel.

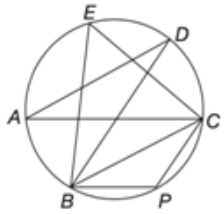
(a) $\frac{5}{13}$ (b) $\frac{6}{13}$ (c) $\frac{7}{13}$ (d) $\frac{8}{13}$

7. In the given figure, $\overline{AB}$ is the diameter of the circle with area π sq. units. Another circle is drawn with C as centre, which is on the given circle and passing through A and B. Find the area of the shaded region.



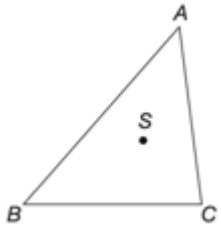
(a) $\frac{\pi}{3}$ sq. units (b) $\frac{2\pi}{3}$ sq. units (c) 1 sq. units (d) 1.2 sq. units

8. In the given figure (not to scale), AC is the diameter of the circle and $\angle ADB = 20^0$, then find $\angle BPC$.



(a) 50^0 (b) 70^0 (c) 90^0 (d) 110^0

9. In ΔABC, AC = BC, S is the circum-centre and $\angle ASB = 150^0$, Find $\angle CAB$.



(a) $55\frac{1}{2}^0$ (b) $52\frac{1}{2}^0$ (c) $62\frac{1}{2}^0$ (d) $35\frac{1}{2}^0$

10. In a triangle, the sum of any two sides exceed the third side by 6 cm. Find its area (in sq. cm).

(a) $12\sqrt{3}$ (b) $9\sqrt{3}$ (c) $15\sqrt{3}$ (d) $18\sqrt{3}$

11. From each corner of a square sheet of side 8 cm, a square of side y cm is cut. The remaining sheet is folded into a cuboid. The minimum possible volume of the cuboid formed is M cubic cm. If y is an integer, then find M.

(a) 32 (b) 18 (c) 36 (d) 12

12. The lengths of the diagonals of a rhombus are 9 cm and 12 cm. Find the distance between any two parallel sides of the rhombus.

(a) 7.2 cm (b) 8 cm (c) 7.5 cm (d) 6.9 cm

13. The equation of one of the diagonals of a square is 3x – 8y + 4 = 0. Find the equation of the other diagonal passing through the vertex (4, –6).

(a) 8x + 3y – 15 = 0 (b) 3x – 8y – 11 = 0

(c) 8x + 3y – 14 = 0 (d) 8x + 3y + 15 = 0

14. P can complete a job in 60 days while Q can complete it in 90 days. With the help of R, they completed it in 20 days. If they earned a total of `3600, then find R's share. (in `)

(a) 1360 (b) 1600 (c) 1480 (d) 1540

PART – III : PHYSICS/ CHEMISTRY

1. Which of the following has the least value of coefficient of friction?

   (a) Rolling friction (b) Limiting friction (c) Static friction (d) Sliding friction

2. A bus travels the first-half of a distance with a speed of 10 m s^{-1} and the next half of the distance with a speed of 20 m s^{-1}. What is the average speed of the bus?

   (a) 13.3 km h^{-1} (b) 13.3 m s^{-1} (c) 0 (d) 13.3 m s^{-1}

3. A body starts moving with an initial velocity of 4 m s–1 and an acceleration of x m s–2. If the distance travelled by it is 30 m in 2nd s, then the value of x is _____.

   (a) 4 (b) 30 (c) 10.3 (d) 17.33

4. What is the work done by a motor to lift 500 kg of a block to 10 m height?

   (a) 9800 J (b) 49000 J (c) 4900 J (d) 98000 J

5. A ball of mass 0.5 kg moving with a velocity 5 m s–1 hits a wall normally and rebounds with half of the initial velocity. If the ball is in contact with the wall for 0.5 s, the force exerted by the wall on it is _____. (a) 3.75 mN (b) 3.75 × 10–2 N (c) 7.5 N (d) 0.375 N

6. Which among the following is a wrong statement?

   (a) Action and reaction act on the same object.

   (b) Action and reaction are equal in magnitude.

   (c) Action and reaction are opposite in direction.

   (d) None of the above

7. A person is standing in an elevator. In which of the following situations, does he find that his weight decreases?

   (a) When the elevator moves upwards with constant acceleration.

   (b) When the elevator moves downwards with constant acceleration.

   (c) When the elevator moves upwards with uniform velocity.

   (d) When the elevator moves downwards with uniform velocity.

8. If velocity and mass of a bullet are 20 m s–1 and 10 g, respectively, then the momentum of the gun after firing a bullet is _____.

(a) 200 kg m s–1 (b) 250 kg m s–1 (c) 0.2 kg m s–1 (d) 350 kg m s–1

9. Which of the following is an example of stable equilibrium?

(a) A ball rolling on a smooth floor.

(b) A lorry moving along a curved path within safe limit.

(c) A rubber ball floating in a water.

(d) A circus artist riding bicycle on a single tyre.

10. The mass and radius of a planet are eight times and two times the mass and radius of the Earth, respectively. Then, the acceleration due to gravity of the planet is _____ times the acceleration due to gravity on the Earth.

(Take g = 10 m s–2)

(a) eight (b) four (c) two (d) three

11. What is the acceleration due to gravity at a height equal to R / 2 from the Earth's surface?

(a) $3/4\ g_0$ (b) $4/3\ g_0$ (c) $9/4\ g_0$ (d) $4/9\ g_0$

12. Which of the following is used in SONAR?

(a) Ultrasonic sound (b) Infrasound

(c) Supersonic sound (d) Infra-red reactivation

13. Velocity of sound in a gas is:-

(a) directly proportionate to its molecular weight.

(b) inversely proportionate to its molecular weight.

(c) directly proportionate to square root of its molecular weight.

(d) inversely proportionate to square root of its molecular weight.

14. Sound travels through rocks in the form of

(a) non-elastic waves. (b) only transverse and elastic waves.

(c) only longitudinal and elastic waves. (d) both longitudinal, transverse and elastic waves

15 True statement about compound is :

(a) A pure compound is heterogeneous in nature

(b) Constituents of a chemical compound can be separated mechanically

(c) Formation of compound involve energy changes

(d) A compound dos not has definite m.p. and b.p

16. Metals and hydrogen are always:

(a) Electropositive (b) Electronegative

(c) Both (a) and (b) (d) None of the above

17 The correct order of evaporation of

Water, Alcohol, Petrol and Kerosene is

(a) Water > Alcohol > Kerosene > Petrol (b) Alcohol > Petrol > Water > Kerosene

(c) Petrol > Alcohol > Water > Kerosene (d) Petrol > Alcohol > Kerosene > Water

18. In rainy day evaporation process takes place.

(a) Fastly (b) Moderately (c) No change (d) Very slowly

19. The amount of heat supplied to convert 100gm of ice at 0ºC to water at 0ºC is

(a) 3.34×10^5 Joules (b) 2.25×10^5 Joules

(c) 22.5×10^6 Joules (d) 33.4×10^3 Joules

20. Choose the correct relation between Celsius and Kelvin :

(a) $^oC = K - 273$ (b) $K = 273 - ^oC$

(c) $K = ^oC + 273$ (d) Both A and C are correct

21. Mercury is used as a thermometric liquid because it has :

(a) Lowest latent heat of fusion (b) Lowest specific heat among all the liquids

(c) High specific heat among all the liquid (d) Can't say

22. Choose the incorrect statement :

(a) Plasma state consists of highly energetic electrons and ions

(b) Bose Einstein condensate is possible at very high temperature and low pressure

(c) Diffusion process depends upon temperature as well as nature of the liquid.

(d) On adding impurities melting point of solid decreases.

23. At higher altitudes

(a) Boiling point of a liquid increases (b) Boiling point of a liquid decreases

(c) No change in boiling point (d) Melting point of solid increases

24. Arrange the following in decreasing order of force of attraction between particles; iodine (violet solid) bromine (brown liquid) Chlorine (greenish, yellow gas)

(a) Cl, Br, I (b) I, Br, Cl

(c) Br, I, Cl

(d) All the three have equal intermolecular force of attraction

25. The law of multiple proportions is illustrated by the two compounds :

(a) Sodium chloride and sodium bromide (b) Ordinary water heavy water

(c) Caustic soda and caustic potash (d) Sulphur dioxide and sulphur trioxide

26. The ratio by mass of C and O in CO_2 is

(a) 1 : 2 (b) 3 : 14 (c) 3 : 8 (d) 3 : 1

27. Law of multiple proportions will remain valid when nitrogen combines with oxygen to from N_2O_3 and

(a) N_2O (b) N_2O_3 (c) N_2O_4 (d) All of these

28. 0.202 g of carbon compound, on combustion, gave 0.361 g of carbon dioxide and 0.47 g of water. Calculate the percentage composition of carbon

(a) 48.76% (b) 8.07% (c) 43.17% (d) 42.17%

PART – V : BIOLOGY

1. Within chloroplasts light is captured by

(a) thylakoids within grana (b) grana within cisternae

(c) cisternae within grana (d) grana within thylakoids

2.. The bacterial cell wall is composed of

(a) a phospholipid matrix (B) a lipoprotein

(c) chitin (d) a polymer of sugars

3. The Golgi apparatus is involved in

(a) transporting protein that are to be released from the cell

(b) packaging proteins into vesicles

(c) altering or modifying proteins

(d) all of the above

4. simple tissues are

(a) parenchyma xylem and phloem (b) parenchyma xylem and sclerenchyma

(c) parenchyma collenchyma and sclerenchyma (d) parenchyma xylem and collenchymas

5. living cells provides tensile and mechanical strength

(a) sclerenchyma (b) collenchyma (c) sclereids (d) phloem

6. collenchyma differs from sclerenchyma in

(a) retaining cytoplan at maturity (b) having thick walls

(c) having a wild lumen (d) being meristematic

7. why are house flies not considered to be biological vectors

(a) they do not spread disease (b) they are pathogens

(c) they do not transmit the disease directly (d) they transmit the disease directly

8.. Select the incorrect statement regarding AIDS

(a) it is an immunodeficiency disease

(b) HIV has RNA as genetic material

(c) AIDS can be transmitted to an infant from the infected mother through her milk

(d) The time lag between the infection and appearance of AIDS symptoms may vary from week to months

9. Materials of biological origin which are commonly used to maintain and improve soil fertility are

(a) green manure (b) biofertilizer

(c) bioinsecticides (d) both a and b

10. Pullorum disease of chickens is caused by

(a) aspergillus fungus (b) paramyxovirus

(c) salmonella bacterium (d) candida fungus

11. Renderpeste is a

(a) bacterial disease (b) viral disease

(c) protozoan disease (d) helminthetic disease

12. Find out incorrect sentence

(a) protista includes unicellular eukaryotic organisms

(b) Whittaker considered cell structure mode and source of nutrition for classified the organism in five kingdoms

(c) both Monera and protista maybe autotrophic and heterotrophic

(d) monerans have wall defined nucleus

13. Which one is a true fish

(a) jellyfish (b) starfish (c) dogfish (d) silverfish

14. Pteridophyta do not have

(a) root (b) stem (c) flowers (d) leaves