

SANTOSH ACADEMIA TALENT EXAMINATION (SATE) (2023-24) CLASS-XI STUDYING-MEDICAL SAMPLE PAPER

Time: 45 Minutes

Max. Marks: 180

IMPORTANT INSTRUCTION

Note: All Question are compulsory

This paper contains 45 questions in total.

Section-I : Question Number 1 to 10 belongs to Physics.

Section-II : Question Number 11 to 20 belongs to Chemistry.

Section-III : Question Number 21 to 25 belongs to Botany

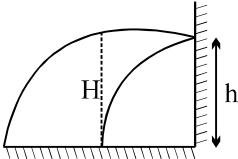
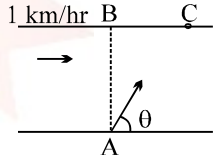
Section-IV : Question Number 26 to 30 belongs to Zoology

Section-V : Question Number 31 to 45 belongs to Mental Ability.

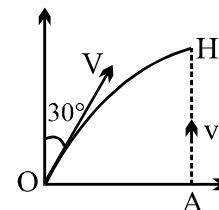
Marking Scheme:

Each question carries 4 marks. For each correct response, the candidate will get 4 marks. There is a negative marking of -1 mark for an incorrect response for section I, II, III and IV. No marks will be deducted for an unmarked question.

There is no negative marking for an incorrect response or an unmarked questions from section V.

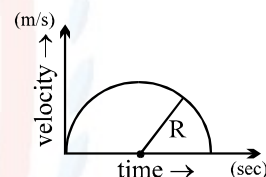
1. A particle moves in space along the path $z = ax^3 + by^2$ in such a way that $\frac{dx}{dt} = c = \frac{dy}{dt}$, where a, b and c are constants. The acceleration of the particle is:
 (a) $(6ac^2x + 2bc^2)\hat{k}$ (b) $(2ax^2 + 6by^2)\hat{k}$ (c) $(4bc^2x + 6ac^2)\hat{k}$ (d) $(bc^2x + 2by)\hat{k}$
2. A stone is projected from a horizontal plane. It attains maximum height 'H' & strikes a stationary smooth wall & falls on the ground vertically below the maximum height. Assume the collision to be elastic, the height of the point on the wall where ball will strike is:
 (a) H/2 (b) H/4
 (c) 3H/4 (d) None of these
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3. A man in a balloon rising vertically with an acceleration of 4.9 m/s^2 releases a ball 2 seconds after the balloon is let go from the ground. The greatest height above the ground reached by the ball is:
 ($g = 9.8 \text{ m/s}^2$)
 (a) 14.7 m (b) 19.6 m (c) 9.8 m (d) 24.5 m
4. A particle is projected at an angle of 45° from a point lying 2 m from the foot of a wall. It just touches the top of the wall and falls on the ground 4 m from it. The height of the wall is:
 (a) $3/4 \text{ m}$ (b) $2/3 \text{ m}$ (c) $4/3$ (d) $1/3 \text{ m}$
5. The velocity at the maximum height of a projectile is half its initial velocity of projection. Its range on the horizontal plane is:
 (a) $\frac{\sqrt{3}u^2}{2g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{3u^2}{2g}$ (d) $\frac{3u^2}{g}$
6. A river is flowing with a speed of 1 km/hr. A swimmer wants to go to point 'C' starting from 'A'. He swims with a speed of 5 km/hr, at an angle θ w.r.t. the river. If $AB = BC = 400 \text{ m}$. Then the value of θ is: $\left[\cos 16^\circ = \frac{24}{25} \right]$
 (a) 37° (b) 30°
 (c) 53° (d) 45°
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7. A boat is moving towards east with velocity 4 m/s with respect to still water and river is flowing towards north with velocity 2 m/s and the wind is blowing towards north with velocity 6 m/s. The direction of the flag blown over by the wind hoisted on the boat is:
 (a) North-west (b) South-east
 (c) $\tan^{-1}(1/2)$ with East (d) North

8. A particle is projected with a speed V from a point O making an angle of 30° with the vertical. At the same instant, a second particle is thrown vertically upward from a point A with speed v . The two particles reach H , the highest point on the parabolic path of the first particle simultaneously, then the ratio V/v is:



- (a) $3\sqrt{2}$ (b) $2\sqrt{3}$
(c) $\frac{2}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{2}$
9. A particle is projected with a certain velocity at an angle θ above the horizontal from the foot of a given plane inclined at an angle of 45° to the horizontal. If the particle strikes the plane normally then θ :

- (a) $\tan^{-1}(1/3)$ (b) $\tan^{-1}(1/2)$ (c) $\tan^{-1}(1/\sqrt{2})$ (d) $\tan^{-1} 3$
10. Velocity time graph of a particle is in shape of a semicircle of radius R as shown in figure. Its average acceleration from $T = 0$ to $T = R$ is:



- (a) 0 m/s^2 (b) 1 m/s^2
(c) $R \text{ m/s}^2$ (d) $2R \text{ m/sec}^2$

SECTION-II CHEMISTRY

11. The sulphate of a metal M contains 9.87% of M . This sulphate is isomorphous with $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$. The atomic weight of M is:
(a) 40.3 (b) 36.3 (c) 24.3 (d) 11.3
12. 20 mL of a mixture of CO and H_2 were mixed with excess of O_2 and exploded and cooled. There was a volume contraction of 18 mL. All volume measurements correspond to room temperature (27°C) and one atmospheric pressure. Determine the volume ratio $V_1 : V_2$ of CO and H_2 in the original mixture.
(a) 1 : 2 (b) 3 : 2 (c) 2 : 3 (d) 4 : 1
13. Monochromatic radiation of specific wavelength is incident on H -atoms in ground state. H -atoms absorb energy and emit subsequently radiations of six different wavelengths. Find wavelength of incident radiations:
(a) 9.75 nm (b) 50 nm (c) 85.8 nm (d) 97.25 nm
14. An open flask containing air is heated from 300 K to 500 K. What percentage of air will be escaped to the atmosphere?
(a) 80 (b) 40 (c) 66.66 (d) 20

15. 80 mL of O₂ takes 2 minute to pass through the hole. What volume of SO₂ will pass through the hole in 3 minute?
- (a) $\frac{120}{\sqrt{2}}$ (b) $120 \times \sqrt{2}$ (c) $\frac{12}{\sqrt{2}}$ (d) none of these
16. Calculate the work done by the system in an irreversible (single step) adiabatic expansion of 2 mole of a polyatomic gas ($\gamma = 4/3$) at 300 K from pressure 10 atm to 1 atm:
- (a) -227 R (b) -205 R (c) -405 R (d) -960 R
17. Calculate ΔS for 3 mole of a diatomic ideal gas which is heated and compressed from 298 K and 1 bar to 596 K and 4 bar: [Given: $C_{v,m}$ (gas) = $\frac{5}{2}R$; $\ln(2) = 0.70$; $R = 2 \text{ cal K}^{-1} \text{ mol}^{-1}$]
- (a) -14.7 cal K⁻¹ (b) +14.7 cal K⁻¹
(c) -4.9 cal K⁻¹ (d) 6.3 cal K⁻¹
18. The equivalent wt. of the salt $\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$ when it acts as reducing agent is:
- (a) $\frac{\text{mol.wt}}{1}$ (b) $\frac{\text{mol.wt}}{2}$ (c) $\frac{\text{mol.wt}}{3}$ (d) $\frac{\text{mol.wt}}{4}$
19. 36 mL of pure water takes 100 sec to evaporate from a vessel and heater connected to an electric source which delivers 806 watt. The $\Delta H_{\text{vaporization}}$ of H₂O is:
- (a) 40.3 kJ/mol (b) 43.2 kJ/mol (c) 4.03 kJ/mol (d) None of these
20. Ionization enthalpy of fluorine is 320 kJ mol⁻¹. The electron gain enthalpy of F⁻ would be:
- (a) -320 kJ mol⁻¹ (b) -160 kJ mol⁻¹ (c) 320 kJ mol⁻¹ (d) 160 kJ mol⁻¹

SECTION-III BOTANY

21. The term cell was given by
- (a) Robert Hooke (b) Tatum (c) Schwann (d) De Bary
22. Photosynthesis occurs in
- (a) Chloroplast (b) Golgi body
(c) Endoplasmic reticulum (d) Nucleus
23. Water is absorbed by
- (a) Root cap (b) Root apex (c) Root hairs (d) Root cortex
24. One of the first acts in taxonomy is
- (a) Identification (b) Description (c) Naming (d) Classification
25. The rate of transpiration will _____ if the atmospheric pressure is low
- (a) Increase (b) Decrease
(c) Stay unchanged (d) Can't be determined

SECTION-IV ZOOLOGY

26. Which class has the largest number of animals?
(a) Fishes (b) Reptiles (c) Insects (d) Mammals
27. The normal diastolic blood pressure in a normal healthy adult human is
(a) 80 mm Hg (b) 60 mm Hg (c) 90 mm Hg (d) 110 mm Hg
28. Which of the following arteries does not carry oxygenated blood?
(a) Systemic (b) Hepatic (c) Pulmonary (d) Cardiac
29. Which is the longest segment of the digestive system in the human body?
(a) Pancreatic duct (b) Small intestine (c) Large intestine (d) oesophagus
30. The human nervous system is capable of a wide range of functions. What is the basic unit of the nervous system?
(a) Glial cell (b) Meninges
(c) Neuron (d) Cerebrospinal fluid

SECTION-IV MENTAL ABILITY

Directions (Q. 31 - 33): In the following questions, four options (numbers/number, pairs/letter groups) are given. Three of them are alike in a certain way and one is different. Find the odd one out from the alternatives.

31. (a) 242 (b) 80 (c) 25 (d) 728
32. (a) EBD (b) IFH (c) QMO (d) YVX
33. (a) BDGK (b) JLOS (c) HJMQ (d) MORU

Directions (Q. 34 - 38): In the following questions, numbers are written in a sequence. Find the missing number, to replace the question mark, from the given alternatives.

34. KM1, IP3, GS6, EV11, ?
(a) BX18 (b) BY16 (c) CY18 (d) CZ18
35. 23, 48, 99, 203, 413, ?
(a) 826 (b) 837 (c) 835 (d) 833
36. 5, 9, 16, 29, 54, 103, ?
(a) 94 (b) 102 (c) 103 (d) 200
37. 4, 5, 7, 10, 11, 13, 16, ?
(a) 48 (b) 38 (c) 20 (d) 14
38. 47, 53, 59, ?, 67, 71
(a) 61 (b) 63 (c) 64 (d) 65

Directions (Q. 39 & 40): Find out the wrong number in the series:

39. 2, 3, 4, 6, 12, 12, 48, 24, 250

- (a) 4 (b) 6 (c) 24 (d) 250

40. 3, 11, 31, 68, 131, 223

- (a) 131 (b) 68 (c) 223 (d) 31

41. If the word TRIPPLE is coded as DMOQHSS, how the word VICTORY will be coded?

- (a) UJBUNSX (b) WHDSPQZ (c) XSNUBJU (d) ZXPSDHW

42. If the word GRANDEUR is coded as NARGRUED, which word will be coded as SERPEVRE?

- (a) PERSERVE (b) PRESEVER (c) PERSEVER (d) PRESERVE

Directions (Q. 43 - 45): Study the information given below and answer the questions that follow:

- (i) P, Q, R, S, T and U are six students procuring their Master's degree in six different subjects-English, History, Chemistry, Physics, Hindi and Mathematics.
(ii) Two of them stay in a hostel, two stay as Paying Guest (PG) and the remaining two stay at home.
(iii) R does not stay as PG and studies Chemistry.
(iv) The students studying Hindi and History do not stay as Paying Guest (PG).
(v) T studies Mathematics and S studies Physics.
(vi) U and S stay in a hostel. T stays as Paying Guest (PG) and Q stays at home.

43. Who studies English?

- (a) R (b) P (c) S (d) T

44. Which of the following combinations of subject and place of stay is not correct?

- (a) English-Hostel (b) Chemistry-Home
(c) Mathematics-Paying Guest (d) Physics-Hostel

45. Which of the following pairs of students stay one each at hostel and at home?

- (a) QR (b) SR (c) PQ (d) PS