INDIAN PUBLIC SCHOOL - WARANGAL

CLASS **8**

IIT - OLYMPIAD PROGRAMME :: MAINS MODEL TEST-4

IMPORTANT INSTRUCTIONS :

All Questions are compulsory. Each correct answer carries 1 marks.

No negative marks, No mark is deducted if not attempted.

All are single correct answers only.

Syllabus:

MATHEMATICS	:**Surds & Multiples & Submultiples**
PHYSICS	:**Optics - Light**
CHEMISTRY	:**Chemical Bonding**

MATHEMATICS

TRACK - I : : SINGLE CORRECT

1. **Which of the following is Irrational number but not surd**

A) π B) 22/7 C) e^1 D) a & c

2. $x=2+\sqrt{3}$ **then** $x+\frac{1}{x}=$

A) 4 B) $2\sqrt{3}$ C) 0 D) we cant't say

3. **Conjugate surd of** $\sqrt{2017}-\sqrt{2018}$

A) $\sqrt{2017}+\sqrt{2018}$ B) $-\sqrt{2017}+\sqrt{2018}$ C) $-\sqrt{2017}-\sqrt{2018}$ D) does not exist

4. **Simplest Rationalising factor of** $\sqrt{75}$

A) $\sqrt{75}$ B) $\sqrt{50}$ C) $\sqrt{3}$ D) $\sqrt{5}$

5. **Order of** $\sqrt[n]{10}$ **is**

A)10 B) n C) $\frac{1}{n}$ D) we can't say

6. **If** $\frac{\sqrt{x}}{\sqrt{x}-1}=\frac{1}{\sqrt{x}-1}$ **then x =**

A) 1 B) 2 C) 0 D) Does not exist

MULTICORRECT

7. **The rationalizing factor of** $\sqrt[3]{2}$ **is**

A) $\sqrt[3]{4}$ B) $\sqrt[3]{32}$ C) $\sqrt[3]{8}$ D) $\sqrt[3]{256}$

8. **If** $\left(4+\sqrt{15}\right)^{\frac{3}{2}}-\left(4-\sqrt{15}\right)^{\frac{3}{2}}=k\sqrt{6},$ **, then k =**

A) 9 B) $\sqrt{81}$ C) $\sqrt{27}$ D) $\sqrt{18}$

9. **The square root of** $11+\sqrt{112}$ **is____**

A) $\sqrt{7}+2$ B) $-\sqrt{7}+2$ C) $-\sqrt{7}-2$ D) $\sqrt{7}-2$

10. **Which of the following are pairs of similar surds?**

A) $\sqrt{2},\sqrt{8}$ B) $5\sqrt{3},3\sqrt{18}$ C) $\sqrt{75},\sqrt{48}$ D) $\sqrt{20},\sqrt{125}$

ASSERSION & REASONING

Directions (11-12) :

A) Both Assertion and Reason are true, Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, Reason is not correct explanation of Assertion.

C) Assertion is true, Reason is false.

D) Assertion is false, Reason is true.

11. Assertion : The rationalizing factor of $\sqrt[9]{10^2}$ *is* $\sqrt[9]{10^7}$

Reason : If $\sqrt[m]{a^n}$ **is a surd, then its rationalizing factor is** $\sqrt[m]{a^{m-n}}\ (m>n)$

12. Assertion : The resultant after dividing $\sqrt[6]{12}$ *by* $\sqrt{3}\times\sqrt[3]{2}$ **and simplified is** $\sqrt[3]{\frac{1}{3}}$

Reason : The Rationalizing factor of $\sqrt[3]{2}$ **is** $\sqrt[3]{2}$

STATEMENT

Directions(13-14) :

A) Both Statements are true, Statement II is the correct explanation of Statement I.

B) Both Statements are true, Statement II is not correct explanation of Statement I.

C) Statement I is true, Statement II is false.

D) Statement I is false, Statement II is true.

13. ***Statement I :*** $\sqrt{8}$ **and** $5\sqrt{2}$ **are similar surds**

Statement II : If $\sqrt{a+\sqrt{b}}=\sqrt{x}+\sqrt{y}$ **then** $\sqrt{a-\sqrt{b}}=\sqrt{x}-\sqrt{y}$

14. Statement-I: Rationalizing Factor of $\sqrt[4]{2}-\sqrt[4]{3}=\sqrt[4]{8}+\sqrt[4]{12}+\sqrt[4]{18}+\sqrt[4]{27}$

Statement-II: Rationalizing Factor of $\sqrt[4]{a}-\sqrt[4]{b}=\sqrt[4]{a^3}+\sqrt[4]{a^2b}+\sqrt[4]{ab^2}+\sqrt[4]{b^3}$

MATCHING

15. Match the following.

Column-I	**Column-II**
1. $\sqrt[4]{3}$	**A)** Dissimilar surds
2. $2\sqrt{3}, 4\sqrt{3}$	**B)** Monomial surd
3. $\sqrt{2}+\sqrt{5}-7$	**C)** Like surds
4. $\frac{3}{2}\sqrt{8}+1$	**D)** Mixed surds
5. $7\sqrt{5}, 7\sqrt{6}$	**E)** Trinomial surd

A) $1\to b, 2\to c, 3\to e, 4\to d, 5\to a$

B) $1\to e, 2\to b, 3\to c, 4\to d, 5\to a$

C) $1\to b, 2\to c, 3\to d, 4\to e, 5\to a$

D) $1\to b, 2\to c, 3\to e, 4\to a, 5\to d$

TRACK - II : : SINGLE CORRECT

16. $\frac{\sin 3A}{\sin A}-\frac{\cos 3A}{\cos A}=$

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

17. $\text{Cos}^2\left(\frac{\pi}{4}-\frac{\theta}{2}\right)-\sin^2\left(\frac{\pi}{4}-\frac{\theta}{2}\right)=$

A) $\cos\theta$ B) $\sin\theta$ C) $\cos\frac{\theta}{2}$ D) $\sin\frac{\theta}{2}$

18. If $180^0<\theta<270^0$ and $\text{Sin}\,\theta=-3/5$ then $\text{Cos}\,\theta/2=$

A) $-\frac{1}{\sqrt{10}}$ B) $\frac{1}{\sqrt{10}}$ C) $\frac{1}{10}$ D) 10

19. $\cos\left(\frac{\pi}{5}\right)\cos\left(\frac{2\pi}{5}\right)=$

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) $\frac{3}{2}$

20. If $A-B=60^0$ then $\cos^2A+\cos^2B-\cos A\cos B=$

A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) $\frac{5}{4}$ D) $\frac{1}{2}$

21. $\frac{1-\text{Sec}8\theta}{1-\text{Sec}4\theta}=$

A) $\text{Sin}8\theta.\text{Cos}2\theta$ B) $\text{Tan}8\theta.\text{Cot}2\theta$ C) $\text{Sec}8\theta.\text{Cot}2\theta$ D) $\text{Tan}8\theta.\text{Tan}2\theta$

MULTICORRECT

22. If $\sin(\alpha+\beta)=1$ and $\sin(\alpha-\beta)=1/2$ where $\alpha,\beta\in[0,\pi/2]$ then

A) $\tan(\alpha+2\beta)=-\sqrt{3}$ B) $\tan(2\alpha+\beta)=-1/\sqrt{3}$ C) $\tan(\alpha+2\beta)=\sqrt{3}$ D) $\tan(2\alpha+\beta)=1/\sqrt{3}$

23. If $\cos(\beta-\gamma)+\cos(\gamma-\alpha)+\cos(\alpha-\beta)=-3/2$ then

A) $\sum\cos\alpha=0$ B) $\sum\sin\alpha=0$ C) $\sum\cos^2\alpha=0$ D) $\sum(\cos\alpha\sin\alpha)=0$

24. The equation $\sin4x+\cos4x=a$ has a real solution for

A) all values of a B) $a=1/2$ C) $a=7/10$ D) $a=1$

25. For $0<\theta<\pi/2$, $\tan\theta+\tan2\theta+\tan3\theta=0$ if

A) $\tan\theta=0$ B) $\tan2\theta=0$ C) $\tan3\theta=0$ D) $\tan\theta\tan2\theta=2$

ASSERSION & REASONING

Directions (26-27) :

A) Both Assertion and Reason are true, Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, Reason is not correct explanation of Assertion.

C) Assertion is true, Reason is false.

D) Assertion is false, Reason is true.

26. **Assertion : Value of** $2\sin 15°.\cos 15°$ *is* $\frac{1}{2}$

Reason : $\sin A = 2\sin\frac{A}{2}\cos\frac{A}{2}$

27. **Assertion :** $\cos 22\frac{1}{2}° = \sqrt{\frac{\sqrt{2}+1}{2\sqrt{2}}}$

Reason : $\cos\frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}}$

STATEMENT

Directions (28-29) :

A) Both statements are true

B) Statement I is True, Statement II is false

C) Statement I is false, Statement II is True

D) Both statements are false

28. **Statement 1:** $\frac{\tan 15° + \tan 30°}{1 - \tan 15°.\tan 30°} = 1$

Statement 2 : $\tan(A+B) = \frac{T\text{an}\ A + TanB}{1 - TanA.\ TanB}$

29. **Statement 1:** $\frac{1+\cos 2\theta}{5\sin 2\theta} = \cot\theta \quad \theta \neq n\pi$

Statement 2: $(\sin A + \cos A)^2 = 1 + \sin 2A$

MATCHING

30. **If cos*x* – sin*x* = 1/2, then match the following.**

Column - I	**Column - II**
A) cos *x* + sin *x*	**p) 3/4**
B) sin 2*x*	**q)** $(\sqrt{7}+1)/4$
C) cos 2*x*	**r)** $\sqrt{7}/4$
	s) $\sqrt{7}/2$

A) **A - s, B - p, C - r** B) **A - p, B - s, C - r** C) **A - s, B - *r*, C - *p*** D) **A - r, B - p, C - s**

PHYSICS

SINGLE CORRECT

31. The ratio of incident angle to the reflected angle is

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

32. A ray of light is incident on a plane mirror at an angle of 20^0 What is the angle of deviation?

A) 60° B) 30° C) 140° D) 180°

33. A watch shows time as 3:25 when seen through a mirror, time appeared will be

A) 8:35 B) 9:35 C) 7:35 D) 8:25

34. What is the deviation suffered by the ray on reflection in the figure given?

A) 50° B) 40° C) 30° D) 60°

35. A ray of light, after reflection from a plane mirror, suffers a deviation of 50^0. Find the angle between the incident and reflected rays.

A) 130° B) 180° C) 150° D) 360°

36. An object is placed in between two mirrors inclined to each other at an angle of 120^0. The number of images obtained due to successive reflections will be

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

MULTICORRECT

37. A medium which allows partially the light energy to pass through it is called

A) Transparent medium B) Translucent medium C) opaque medium D) denser medium

38. Which of the following statement/s is/are true in case of a plane mirror

A) The image is formed behind the mirror and has the same size as the object

B) The image is erect and laterally inverted.

C) The image is as far behind the mirror as the object is in front of it.

D) The image is virtual. It cannot be received on a screen.

39. Which of the following pair is/are true when two mirrors are inclined with certain angle.

A) Angle between the two mirros is 30^0, No. Of images formed is 11

B) Angle between the two mirros is 50^0, No. Of images formed is 7

C) Angle between the two mirros is 45^0, No. Of images formed is 7

D) Angle between the two mirros is 60^0, No. Of images formed is 6

40. Which of the following statement/s is/are are wrong

a) Angle of incidence is the angle between the incident ray and the normal

B) Angle of deviation is zero in case of transmission of light

C) Angle of incidence is different from angle of reflection

D) Angle of incidence is always greater than angle of reflection

ASSERSION & REASONING

Directions (41-42) : Read the assertion and reason carefully to mark the correct option out of the options given below:

A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

B) If both assertion and reason are true but reason is not the correct explanation of the assertion.

C) If assertion is true but reason is false.

D) If the assertion and reason both are false.

41. Assertion : When an object is placed between two plane parallel mirrors, then all the images found are of equal intensity.

Reason : In case of plane parallel mirrors, only two images are possible.

42. Assertion : The size of the mirror affect the nature of the image.

Reason : Small mirrors always forms a virtual image.

STATEMENT

Directions (43- 44) :

A) I is wrong and II is true

B) I is true & II is wrong

C) Both I & II true

D) None

43. Statement -1: The bodies which do not allow the light energy to pass through them are called opaque bodies.

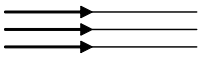
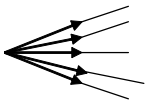
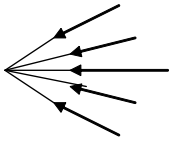
Statement - 2 : Virtual images can be formed on a screen.

44. Statement - 1: A collection of points which actually serves as a source of light rays in an optical system is known as real object.

Statement - 2 : the least height of the mirror should be half the height of the observer.

MATCHING

45. Match the following:

Column-I	**Column-II**
1) Ray of light	a) 
2) Parallel beam of light	b) 
3) Divergent beam of light	c) 
4) Convergent beam of light	d)

A) 1 - d; 2 - a; 3 - b ; 4 - c

B) 1 - a; 2 - d; 3 - b ; 4 - c

C) 1 - c; 2 - a; 3 - d ; 4 - b

D) 1 - a; 2 - b; 3 - c ; 4 - d

CHEMISTRY : : SINGLE CORRECT

46. In the farmation of covalent bond

A) transter of electrons take place
B) electrons are gained by only one atom
C) sharing of electrons take place
D) gaining of electrons take place

47. A covalent bond is likely to be formed between two elements which

A) have high electronegativities
B) have low ionization energies
C) have low melting points
D) form ions with a small charge

48. Covalent compounds are generally soluble in

A) polar solvents B) non-polar solvents C) concentrated acids D) all solvents

49. Maximum number of covalent bonds by which two atoms can be bonded to each other

A) Four B) Two C) Three D)No fixed number

50. Among the alkaline earth metals, the element forming predominantly covalent compound is

A) Be B) Mg C) Sr D) Ca

51. The molecule that deviates from octet rule is

A) CCl_4 B) BF_3 C) MgO D) NCl_3

MULTICORRECT

52. In which of the following molecule(s), multiple bond is present:

A) CO_2 B) O_2 Ci) N_2 D) HCN

53. Which of the following is/are covalent

A) HF B) NH_3 C) MgO D) H_2O

54. Which of the following obey's octet rule

A) NH_3 B) BeF_2 C) H_2O D)HCl

55. Which of the following is/are not correct

A) Diamond is a covalent compound
B) covalent bond is directional bond
C) CCl_4 is not a covalent compound
D) Covalent compound does not low isomerism

ASSERSION & REASONING

Directions (56-57)

A) Both assertion and reason are correct and reason is the correct explanation of assertion

B) Both assertion and reason are correct but reason is not the correct explanation of assertion

C) Assertion is correct and reason is incorrect

D) Assertion is incorrect and reason is correct

56. Assertion (A) : Chlorine is a gas where as Bromine is a liquid.

Reason (R) : Vanderwaal forces of attraction are more in bromine than in chlorime.

57. Assertion (A) : Melting point of diamong is very high.

Reason (R) : Ionic bonds are present in diamong.

STATEMENT

Directions (58-59) :

A) Both statements are true

B) Statement I is True, Statement II is false

C) Statement I is false, Statement II is True

D) Both statements are false

58. Statement I : methane (CH_4) is covalent compound

Statement II : hydrocarbons are covalent compounds

59. Statement I : A bond formed by the equal contribution and equal sharing of electrons between two atoms or more atoms is known as covalent bond

Statement II : The pair of electrons, present in the valence shell but not involved in the bonding is called the "bonded pair"

MATCHING

60. Match the following

a) H_2	**i) 4 electrons shared**
b) O_2	**ii) Triple bond is present**
c) N_2	**iii) 2 electrons shared**
d) SF_6	**iv) Do not follow octect rule**

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

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