DR K.K.R'S GOWTHAM(E.M) SCHOOL
RAJAMAHENDRAVARAM

Class: 9-A1,A2 **FACT TEST** **Marks : 100M**

Subject: MATHS, PHYSICS, CHEMISTRY **Time: 2 ½ hrs**

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Name of the Student: _____ ***Sec:*** _____ ***G.C.S. .*** _____

I. Choose the correct answer 20x1=20M

1. Let the function f(x) be defined as follow [ ]

$$f(x)=\begin{cases} x^3+x^2-10x & -1\le x<0 \\ \cos x & 0\le x<\frac{\pi}{2} \\ 1+\sin x & \frac{\pi}{2}\le x\le\pi \end{cases} \text{ then}$$

f(x) has

a.a local minimum at x = $\frac{\pi}{2}$ b. a global maximum at x = $\frac{\pi}{2}$ c. an absolute maximum at x = π

2. A bell tent consists of a conical portion above a cylindrical portion near the ground. For a given volume and a circular base of a given radius, the amount of the canvas used is a minimum when the semi-vertical angle of the cone is [ ]

a. $\cos^{-1} 2/3$ b. $\sin^{-1} 2/3$ c. $\cos^{-1} 1/3$ d. None of these

3. A rectangle is inscribed in an equilateral triangle of side length 2a units. The maximum area of this rectangle can be [ ]

a. $\sqrt{3}a^2$ b. $\frac{\sqrt{3}a^2}{4}$ c. a^2 d. $\frac{\sqrt{3}a^2}{2}$

4. The maximum area of the triangle rectangle whose sides pass through the vertices of a given rectangle of sides a and b is [ ]

a. 2(ab) b. $\frac{1}{2}(a+b)^2$ c. $\frac{1}{2}(a^2+b^2)$ d. None of these

5. The minimum value of 27sec x + 64 cosec x for $x \in \left(0,\frac{\pi}{2}\right)$ is ….. and is obtained at [ ]

a. 25, $\tan^{-1}\left(\frac{4}{3}\right)$ b. 125, $\tan^{-1}\left(\frac{4}{3}\right)$ c. 125, $\tan^{-1}\left(\frac{3}{4}\right)$ d. 25, $\tan^{-1}\left(\frac{3}{4}\right)$

6. A wire of length 20cm is cut into two parts which are bent in the form of a square and a circle, then the least value of the sum of areas so formed is [ ]

a. $\frac{400}{\pi+4}$ b. $\frac{20}{\pi+4}$ c. $\frac{5}{\pi+4}$ d. $\frac{100}{\pi+4}$

7. The maximum value of the area of the triangle with vertices (a, 0) (a cos θ, bsin θ) and (a cos θ, -b sin θ) is

a. $\frac{3\sqrt{3}ab}{4}$ b. $\sqrt{3}ab$ c. $\frac{3\sqrt{3ab}}{4}$ d. $\sqrt{3ab}$

8. A point on the hypotenuse of a right angle Δ^{le} is at a distance of 'a' and 'b' units from the sides, then the least value of the hypotenuse is [ ]

a. $\left(a^{2/3}-b^{3/2}\right)^{3/2}$ b. $\left(a^{2/3}+b^{2/3}\right)^{3/2}$ c. ab d. $a^{2/3}+b^{2/3}$

9. The function f(x) = $\cos\left(\frac{\pi}{x}\right)$ is monotonically increasing in the interval (k is any positive integer) is[ ]

a. $\left(\frac{1}{2k+1},\frac{1}{2k+2}\right)$ b. $\left(\frac{1}{2k+1},\frac{1}{2k}\right)$ c. $\left(\frac{1}{2k},\frac{1}{2k+1}\right)$ d. $\left(\frac{1}{2k+2},\frac{1}{2k+1}\right)$

10. Let f, g and h be real-valued functions defined on the interval [0,1] by f(x) = e^{x^2} + e^{-x^2} . If a, b and c denote, respectively, the absolute maximum of f, g and h on [0,1], then [ ]

a. a = b and c $\neq$ b b. a = c and a $\neq$ b c. a $\neq$ b and c $\neq$ b d. a = b = c

11. If the constant term in the expansion $\left(\sqrt{x}-\frac{k}{x^2}\right)^{10}$ is 405 then k is [ ]

a. $\pm\ 3^{1/4}$ b. $\pm 4^{1/3}$ c. ± 2 d. ± 3

12. The greatest integer which divides the number 101^{100}-1 is [ ]

a. 10^2 b. 10^3 c. 10^4 d. 10^5

13. ${}^6C_5 + \sum_{j=1}^{5} 11-j\ C_4$ = [ ]

a. ${}^6C_6$ b. ${}^{11}C_4$ c. ${}^{11}C_5$ d. ${}^{12}C_5$

14. Coefficient of x^3 in 1+(1+x) + $(1+x)^2$ + ……. + $(1+x)^n$ is [ ]

a. ${}^nC_4$ b. ${}^{(n+1)}C_4$ c. ${}^{(n+2)}C_4$ d. ${}^{(n+1)}C_2$

15. The coefficient of $x^2y^3z^4$ in $(ax-by+cz)^9$ is [ ]

a. 1260 $a^2b^3c^4$ b. -1220 $a^2b^3c^4$ c. -1260 $a^2b^3c^4$ d. 1220 $a^2b^3c^4$

16. Larger of 99^{50} + 100^{50} and 101^{50} is [ ]

a. 101^{50} b. 99^{50} + 100^{50} c. Both are equal d. cannot be decided

17. The number of integral terms in the expansion of ($\left(\sqrt{3}+\sqrt[4]{5}\right)^{200}$ is [ ]

a. 49 b. 50 c. 52 d. 51

18. If. $\left(5+2\sqrt{6}\right)^n$ = I + f, where I $\in$ N, n $\in$ N and 0 < f< 1, then I = [ ]

a. $\frac{1}{f}-f$ b. $\frac{1}{1+f}-f$ c. $\frac{1}{1-f}-f$ d. $\frac{1}{1-f}+f$

19. For r = 0, 1, ……. 10, Let Ar, Br and Cr denote, respectively, the coefficient of x^r in the expansions of $(1+x)^{10}$, $(1+x)^{20}$ and $(1+x)^{30}$. Then $\sum_{r=1}^{10} A_r\left(B_{10}B_r - C_{10}A_r\right)$ is equal to r = 1 [ ]

a. $B_{10} - C_{10}$ b. A_{10} ($B^2_{10} - C_{10}A_{10}$) c. 0 d. $C_{10} - B_{10}$

20. The sum $\sum_{r=1}^{10}\left(r^2+1\right)\times\left(r!\right)$ is equal to [ ]

a. 10 x (11!) b. 101 x (10!) c. (11 !) d. 11 x (11!)

PHYSICS

21. If the angle of a thin prism is 4.5° and refractive index 1.52 the deviation produced by the prism is[ ]

a. 2^0 b. 3^0 c. 2.34° d. 0.76°

22. Find the dispersive power of flint glass. The refractive index of flint glass for red, yellow, and violet light are. 1.613, 1.620 and 1.632 respectively [ ]

a. 0.0306 b. 0.828 c. 1.414 d. 1.65

23. A thin prism p_1 of angle of prism 4° and refractive index 1.54 is combined with another thin prism p_2 of refractive index. 1.72 for dispersion without deviation. The angle of prism of P_2 is [ ]

a. 5.33° b. 4° c. 3° d. 2.6°

24. The refractive indices for the light of violet and red colours of any material are 1.66 and 1.64 respectively. If the angle of prism made of this material is 10^{10} then angular dispersion will be [ ]

a. 0.20° b. 0.10° c. 0.40° d. 1°

25. For focal length of a thin lens for red and violet light are 90cm and 86.4cm find the dispersive power of the material of the lens [ ]

a. 0.036 b. 0.042 c. 1.414 d. 1.65

26. Two lenses having $f_1:f_2 = 2:3$ has combination to make no dispersion.Find the ratio of dispersive power of glasses used [ ]

a. 2 : 3 b. 3 : 2 c. 4 : 9 d. 9 : 4

27. An air bubble in a glass slab ($\mu = 1.5$) is 5 cm deep when viewed from one face and 2 cm deep when viewed from the opposite face. The thickness of the glass slab is [ ]

a. 7cm b. 10 cm c. 7.5 cm d. 10.5 cm

28. A ring of radius 1 cm is placed 1 m infront of a spherical glass ball of radius 25 cm with refractive index 1.50. Determine the position of the final image of the ring and its magnification [ ]

a. $\frac{200}{7}$ cm b. $-\frac{5}{7}$ cm c. $-\frac{3}{7}$ cm d. $-\frac{300}{7}$ cm

29. A transparent sphere of radius R made of material of refractive index $\frac{3}{2}$ is kept in air. The distance from the centre of sphere must a point object be placed so as to form a real image at the same distance from the sphere is [ ]

a. R b. 2R c. 3R d. 4R

30. A ray incident at a point at an angle of incidence 60° enters a glass sphere of $\mu = \sqrt{3}$ and is reflected and refracted at the farther surface of the sphere the angle between the reflected and refracted rays at this surface is [ ]

a. 50° b. 90° c. 60° d. 40°

31. An object is placed in a denser medium at a distance of 24 cm from a convex surface of denser medium of refractive index 1.5 and radius of curvature 24cm. Find the position of image [ ]

a. 72 cm (real) b. 24 cm (virtual) c. 48 cm (virtual) d. 84 cm (real)

32. A prism of refracting angle 60° is made with a material of refractive index μ. For a certain wavelength of light the angle of minimum deviation is 30°. For this wavelength of μ material is [ ]

a. 1.732 b. 2.828 c. 1.414 d. 1.65

33. The minimum deviations suffered by red, yellow and violet beams passing through an equilateral transparent prism are 38.4°, 38.7° and 39.2° respectively. Calculate the dispersive power of the medium [ ]

a. 0.0402 b. 0.0206 c. 1.414 d. 1.65

34. Three prisms of crown glass, each have angle of prism 9° and two prisms of flint glass are used to make direct vision spectroscope. What will be the angle of flint glass prisms if μ in flint is 1.60 and μ for crown glass is 1.53 [ ]

a. 11.9° b. 16.0° c. 15.3° d. 9.11°

35. If the refractive indices of a prism for red, yellow and violet colours be 1.61, 1.63 and 1.65 respectively. Then the dispersive power of the prism will be [ ]

a. $\frac{1.65-1.62}{1.61-1}$ b. $\frac{1.62-1.61}{1.65-1}$ c. $\frac{1.65-1.61}{1.63-1}$ d. $\frac{1.65-1.63}{1.61-1}$

CHEMISTRY

36. The ionic radii in A° of N^{-3}, O^{-2}, F^{-} respectively are [ ]

a. 1.36, 1.40, 1.71 b. 1.36, 1.71, 1.40 c. 1.71, 1.40, 1.36 d. 1.71, 1.36, 1.40

37. Which of the following alkaline earth metal sulphates has its hydration enthalpy greater than its lattice energy [ ]

a. $CaSO_4$ b. $BeSO_4$ c. $BaSO_4$ d. $SrSO_4$

38. The first ionisation potential of Na is 5.1 eV. The value of electron gain enthalpy of Na^{+} is [ ]

a. -2.55 eV b. -5.1 eV c. -10.2 eV d. +2.55 eV

39. Which of the following represents the correct order of second ionisation potential of carbon, Nitrogen, Oxygen and fluorine is [ ]

a. C>N>O>F b. O > N > F > C c. O >F >N > C d. F > O > N > C

40. Amongst the following elements the one having highest ionisation energy [ ]

a. [Ne] $3s^2$ $3p^1$ b. [Ne] $3s^2 3p^3$ c. [Ne] $3s^2 3p^2$ d. [Ar] $3d^{10}$ $4s^2$ $4p^3$

41. Which of the following has the maximum number of unpaired electrons [ ]

a. mg^{+2} b. Ti^{+3} c. V^{+3} d. Fe^{+2}

42. Which is the most stable +2 oxidation state [ ]

a. Sn b. Pb c. Fe d. Ag

43. Identify the least stable ion among the following [ ]

a. Li^{+} b. Be^{-} c. B^{-} d. C^{-}

44. The first four ionisation values for an element are 191, 578, 872 and 5962 k.Cal. the number of valence electrons in the elements is [ ]

a. 1 b. 2 c. 3 d. 4

45. Among Al_2O_3, SiO_2, P_2O_3 & SO_2 the correct order of Acidic strength is [ ]

a. $SO_2 < P_2O_3 < SiO_2 < Al_2O_3$ b. $SiO_2 < SO_2 < Al_2O_3 < P_2O_3$

c. $Al_2O_3 < SiO_2 < SO_2 < P_2O_3$ d. $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$

46. The radius of La^{+3} (Z = 57) is 106 A°, Then the radius of Lu^{+3} (Z= 71) may be [ ]

a. 1.60 A° b. 1.40 A° c. 1.06 A° d. 0.85 A°

47. Ce^{+3}, La^{+3}, Pm^{+3} and yb^{+3} have ionic radii in the increasing order as [ ]

a. $La^{+3} < Ce^{+3} < Pm^{+3} < yb^{+3}$ b. $yb^{+3} < Pm^{+3} < Ce^{+3} < La^{+3}$

c. $La^{+3} = Ce^{+3} < pm^{+3} < yb^{+3}$ d. $yb^{+3} < pm^{+3} < La^{+3} < Ce^{+3}$

48. Energy of an electron in the ground state of Hydrogen atom is -2.18×10^{-18} J. Calculate the ionisation enthalpy of atomic hydrogen in terms of $Jmol^{-1}$ [ ]

a. 2.18×10^{-18} b. 13.12×10^{5} c. 3.16×10^{-13} d. 2.21×10^{6}

49. Which of the following does not represent correct order of the property indicated [ ]

a. $Se^{+3} > Cr^{+3} > Fe^{+3} > Mn^{+3}$ – Ionic radii b. Sc < Ti < Cr < Mn – Density

c. $Mn^{+2} > Ni^{+2} > Co^{+2} > Fe^{+2}$ - Ionic radii d. Feo < Cao < MnO < CuO – basic nature

50. The first ionisation enthalpies of two isotopes of an element are [ ]

a. Same b. different c. some that different d. IE_1 = IE_2

1^{st} isotope 2^{nd} Isotope