

Dr.K.K.R GOWTHAM (E.M) HIGH SCHOOL :: AP & TS

Class: 9-A1, A2

FACT TEST

Marks : 100M

Subject: MATHS, PHYSICS, CHEMISTRY

Time: 1½ hr

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

I. Choose the correct answer 50x2=100M

1. $\lim_{x \rightarrow \infty} \left[\left(\frac{n}{n+1} \right)^\alpha + \sin \frac{1}{n} \right]^n$ (when $\alpha \in \mathbb{Q}$) is equal to []

- a. $e^{-\alpha}$ b. $-\alpha$ c. $e^{1-\alpha}$ d. $e^{1+\alpha}$

2. If $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x^2}\right), & x \neq 0 \\ 0 & x = 0 \end{cases}, (n \in \mathbb{I}),$ then, []

- a. $\lim_{x \rightarrow 0} f(x)$ exists for $n > 1$ b. $\lim_{x \rightarrow 0} f(x)$ exists for $n < 0$
 c. $\lim_{x \rightarrow 0} f(x)$ does not exist for any value of n d. $\lim_{x \rightarrow 0} f(x)$ cannot be determined

3. $\lim_{x \rightarrow 1} \frac{(1-x)(1-x^2)\dots(1-x^{2n})}{\{(1-x)(1-x^2)\dots(1-x^n)\}^2}, n \in \mathbb{N}$ []

- a. $2n P_n$ b. $2^n C_n$ c. $(2n)!$ d. none of these

4. $f(x) = \lim_{n \rightarrow \infty} \frac{(x-1)^{2n} - 1}{(x-1)^{2n} + 1}$ is discontinuous at []

- a. $x = 0$ only b. $x = 2$ only c. $x = 0$ and 2 d. none of these

5. If $f(x) = \sqrt{1 - \sqrt{1 - x^2}}$, then $f(x)$ is []

- a. continuous on $(-1, 1)$ and differentiable on $(-1, 1)$
 b. continuous on $(-1, 1)$ and differentiable on $(-1, 0) \cup (0, 1)$
 c. continuous and differentiable on $(-1, 1)$ d. none of these

6. If $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x} + \frac{b}{x^2} \right)^{2x} = e^2$, then the value of a and b are []

- a. $a \in \mathbb{R}, b \in \mathbb{R}$ b. $a = 1$ and $b = 2$ c. $a \in \mathbb{R}, b = 2$ d. $a = 1, b \in \mathbb{R}$

7. The integer 'n' for which $\lim_{x \rightarrow 0} \frac{(\cos x - 1)(\cos x - e^x)}{x^n}$ is a finite non zero number is []

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

8. $\lim_{n \rightarrow \infty} \cos\left(\frac{x}{2}\right) \cos\left(\frac{x}{4}\right) \cos\left(\frac{x}{8}\right) \dots \cos\left(\frac{x}{2^n}\right) =$ []

- a. 1 b. $\frac{\sin x}{x}$ c. $\frac{x}{\sin x}$ d. 2

9. If $f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous at $x = 0$ then $f(0) =$ []

a. $\frac{1}{2}$ b. $\frac{1}{4}$ c. $\frac{1}{6}$ d. $\frac{1}{8}$

10. If $(fx) = \frac{x(e^{\frac{1}{x}} - e^{-\frac{1}{x}})}{e^x + e^{-1/x}}$, $x \neq 0$ is continuous at $x = 0$ then $f(0) =$ []

a. 1 b. 2 c. 0 d. 3

11. $f(x) = \begin{cases} -2 \sin x & \text{if } x \leq -\frac{\pi}{2} \\ a \sin x + b & \text{if } -\frac{\pi}{2} < x < \frac{\pi}{2} \text{ and } (fx) \text{ is continuous at every where then } (a, b) = \\ \cos x & \text{if } x \geq \frac{\pi}{2} \end{cases}$ []

a. (1,1) b. (-1,1) c. (1, -1) d. (-1, -1)

12. If $x^y = \log x$ then $\frac{dy}{dx}$ at $x = e$ is []

a. 0 b. 1 c. e d. $\frac{1}{e}$

13. If $\cos\left(\frac{x}{2}\right) \cos\left(\frac{x}{2^2}\right) \cos\left(\frac{x}{2^3}\right) \dots$ to $\infty = \frac{\sin x}{x}$ then $\frac{1}{2^2} \sec^2\left(\frac{x}{2}\right) + \frac{1}{2^4} \sec^2\left(\frac{x}{2^2}\right) + \dots$

a. $\operatorname{cosec}^2 x - \frac{1}{x}$ b. $\operatorname{cosec}^2 x - \frac{1}{x^2}$ c. $\operatorname{cosec}^2 x + \frac{1}{x}$ d. $\frac{-1}{x^2}$ []

14. If $x^y + y^x = a^b$ then $\frac{dy}{dx} =$ []

a. $-\left(\frac{yx^{y-1} + y^x \log y}{x^y \cdot \log x + xy^{x-1}}\right)$ b. $\frac{y \cdot x^{y-1} + y^x \cdot \log y}{x^y \cdot \log x + x \cdot y^{y-1}}$ c. xy d. $\frac{x}{y}$

15. Water is being poured into the inverted conical vessel at the rate of 1.5 cubic meter per minute. Its depth is always equal to twice its radius. The level of water is rising at the rate of $\frac{3}{8\pi}$ meter per minute when its depth is []

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

16. A source of light is hung a mt directly above a straight horizontal path on which a boy 'b' metre in height is walking. How fast is the shadow lengthening when he is walking away from the light at the rate of 'c' mt/min? []

a. $\frac{bc}{a-b}$ mt/min b. $\frac{bc}{a+b}$ mt/min c. $\frac{bc}{2(a-b)}$ mt/min d. $\frac{bc}{2(a+b)}$ mt/min

17. An inverted cone has a depth of 10 cms and a base of radius 5cms. Water is poured into it at the rate of 1.5 cc/sec. The rate at which water is raising when the depth is 4 cms is []
- a. 0.5 cms/sec b. $\frac{5}{\pi}$ cms/sec c. $\frac{3}{8}\pi$ cms/sec d.. cms/sec
18. If the tangent at the point (at^2, at^3) on the curve $ay^2 = x^3$ meets the curve again at Q, then Q =
- a. $\left(\frac{at^2}{4}, \frac{-at^3}{8}\right)$ b. $\left(\frac{at}{4}, 8at\right)$ c. $\left(\frac{at}{2}, 2at^2\right)$ d. $\left(\frac{at}{2}, at^2\right)$ []
19. If the curves $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $\frac{x^2}{l^2} - \frac{y^2}{m^2} = 1$ cut each other orthogonally then []
- a. $a^2 + b^2 = l^2 + m^2$ b. $a^2 - b^2 = l^2 - m^2$ c. $a^2 - b^2 = l^2 + m^2$ d. $a^2 + b^2 = l^2 - m^2$
20. The equation of the straight lines which are both tangent and normal to the curve $27x^2 = 4y^3$ are
- a. $x = \pm \sqrt{2} (y-2)$ b. $x = \pm \sqrt{3} (y-2)$
c. $x = \pm \sqrt{2} (y-3)$ d. $x = \pm \sqrt{3} (y-3)$ []

PHYSICS

21. When light passes through a boundary , refraction will not take place if []
- a) light is incident normally on the boundary
b) the index of refraction of the two media is same
c) angle of incidence is less than angle of refraction and angle of incidence is greater than critical angle.
d) all the above
22. **Statement I** : Due to refraction of light stars appears twinkling in the Sky. []
Statement II : Due to reflection of light stars appears twinkling in the Sky.
- a) Both Statements are true b) Both Statements are false
c) Statement - I is true, Statement - II is false.
d) Statement - I is false, Statement - II is true.
23. A plane glass slab is kept over various coloured letters ; the letter which appears least raised is :
a) blue b) violet c) green d) red []
24. The refractive index of glass is $\frac{3}{2}$. The time taken by a monochromatic light rays to travel a distance 'd' in air is 4s. The time taken by the light ray to travel the same distance in glass is
a) 4s b) 6s c) $\frac{8}{3}$ s d) 3s []
25. When monochromatic light is refracted from a medium of refractive index 1.72 in to vaccum, its wave length []
a) decreases by 72% b) increases by 72 %
c) increases by 28% d) decreases by 28%

26. A ray of light is traveling from medium A into rarer medium B. The angle of incidence is 45° and the angle of deviation is 15° . The refractive index of medium A w.r.t B is []

- a. $\sqrt{\frac{3}{2}}$ b. $\frac{\sqrt{3}}{2}$ c. $\frac{1}{\sqrt{2}}$ d. $\sqrt{\frac{2}{3}}$

27. A ray of light entering from air to glass (refractive index 1.5) is partly reflected and partly refracted. If the incident and the reflected rays are at right angles to each other, the angle of refraction is

- a) $\sin^{-1}\left(\sqrt{\frac{2}{13}}\right)$ b) $\sin^{-1}\left(\frac{\sqrt{2}}{3}\right)$ c) $\sin^{-1}\left(\frac{2}{\sqrt{13}}\right)$ d) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ []

28. A glass cube of edge 1 cm and $\mu = 1.5$ has a small spot at the centre. The area of the cube face that must be covered to prevent the spot from being seen is []

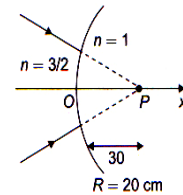
- a) $\left(\frac{\pi}{5}\right) \text{ cm}^2$ b) $5\pi \text{ cm}^2$ c) $\left(\frac{\pi}{\sqrt{5}}\right) \text{ cm}^2$ d) $\sqrt{5}\pi \text{ cm}^2$

29. When light ray passes rarer medium (μ_1) into denser medium (μ_2), the object distance (u) and image distance (v) then the radius of curvature (R) of the concave refracting surface []

- a) $\frac{(\mu_2 - \mu_1)uv}{\mu\mu_2 - v\mu_1}$ b) $\frac{\mu_2u - v\mu_1}{(\mu_2 - \mu_1)uv}$ c) $\frac{(\mu_1 - \mu_2)uv}{v\mu_1 - u\mu_2}$ d) $\frac{v\mu_1 - u\mu_2}{(\mu_1 - \mu_2)uv}$

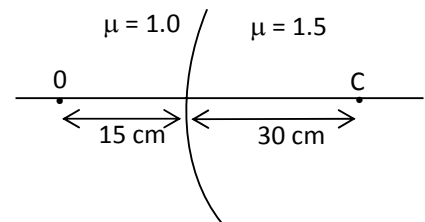
30. The image for the converging beam after refraction through the curved surface is formed at

- a) $x = 40 \text{ cm}$ b) $x = \frac{40}{3} \text{ cm}$ []
 c) $x = -\frac{40}{3} \text{ cm}$ d) $x = \frac{180}{7} \text{ cm}$



31. Locate the image of the point object O in the situation shown in figure. The point C denotes the centre of curvature of the separating surface.

- a) 10cm b) 20cm []
 c) 30cm d) 15cm



32. A ray of light is incident on one of the faces with an angle 50° with the surface. The refracting angle of the prism is 60° . The emergent ray is deviated through an angle 42° . The angle made by the emergent ray with the surface is []

- a) 28° b) 32° c) 42° d) 54°

33. The angle of a prism is A and one of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface return back through the same path after suffering reflection at the silvered surface. The refractive index of the prism material is []

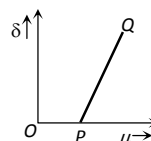
- a) $2 \sin A$ b) $2 \cos A$ c) $2 \cot A$ d) $2 \tan A$

34. One face of the glass prism is silver polished. A light ray falls at an angle of 45° on the other face. After reflection it is subsequently reflected from the silvered face and then retraces its path. The refracting angle of the prism is 30° . The refractive index of the prism is []

- a) $\frac{3}{2}$ b) $\sqrt{2}$ c) $\frac{\sqrt{3}}{2}$ d) $\sqrt{3}$

35. For a small angled prism, angle of prism A, the angle of minimum deviation (δ) varies with the refractive index of the prism as shown in the graph

- a) Point P corresponds to $\mu = 1$
 b) Slope of the line PQ = A/2
 c) Slope = A d) Both a and c are correct



CHEMISTRY

36. The conjugate acid of HPO_4^{2-} is []
a. H_2PO_4^- b. PO_4^{3-} c. H_3PO_4 d. H_3PO_3
37. Highest p^{H} value stands for []
a. An acidic solution b. A basic solution c. A slightly basic solution d. Neutral solution
38. The pH of a 0.005 M aqueous solution of sulphuric acid is approximately []
a. 0.005 b. 2 c. 1 d. 0.01
39. 0.2 M solution of formic acid is 3.2% ionised its ionisation constant is []
a. 9.6×10^{-3} b. 2.1×10^{-4} c. 1.25×10^{-6} d. 4.8×10^{-5}
40. 20 ml of a 0.1 N HCl is mixed with 20 ml of a .1 N KOH. The pH of the solution would be []
a. zero b. 7 c. 2 d. 9
41. Methyl orange gives red colour in []
a. KOH solution b. HCl solution c. Na_2CO_3 solution d. NaCl solution
42. Which of the following salt undergo hydrolysis []
a. CH_3COOK b. NaNO_3 c. KCl d. K_2SO_4
43. The solubility of A_2B_3 is $x \text{ mol dm}^{-3}$ its K_{sp} is []
a. $6x^4$ b. $64x^4$ c. $36x^5$ d. $108x^5$
44. n – propylamine and isopropyl amine are example of []
a. position isomerism b. chain isomerism c. tansomerism d. Geometrical isomerism
45. The number of structural isomers with formula $\text{C}_4\text{H}_{11}\text{N}$ []
a. 2 b. 8 c. 6 d. 5
46. The dihedral angle between two methyl groups in gauche form of n – butane []
a. 120° b. 60° c. 180° d. 0°
47. Which of the following does not show geometrical isomerism []
a. 1,2 – dichloro – 1 – pentene b. 1,3 – dichloro – 2 – pentene
c. 1, 1 – dichloro – 1 – pentene d. 1,4 – dichloro – 2 – pentene
48. The number of optically active forms of the compound $\text{CH}_3\text{CHBrCHBrCOOH}$ is []
a. 0 b. 1 c. 3 d. 4
49. Which of the following may have a meso isomer []
a. 2 – chlorobutane b. 2, 3 – dichlorobutane
c. 2, 3 – dichloropentane d. 2 – hydroxypropanoic acid
50. Optically active among the following is []
a. Meso tartaric acid b. dl – tartaric acid
c. Meso – 2 , 3 – butane diol d. Erythro – 2, 3 – dihydroxy butanoic acid