

**RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE, RAHARA, KOLKATA**  
**Undergraduate Admission Test 2023: Computer Science Honours**

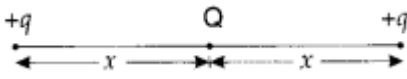
**Full Marks : 75**

**Time : 1 hour**

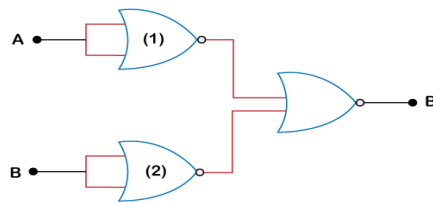
*(The symbols have their usual meanings)*

- Let  $A = \{a, b, c\}$  and let  $R = \{(a, a), (a, b), (b, a)\}$ . Then,  $R$  is
  - Reflexive and Symmetric but not transitive
  - Reflexive and transitive but not Symmetric
  - Symmetric and transitive but not Reflexive
  - An equivalence relation
- $f : \mathbb{N} \rightarrow \mathbb{N} : f(x) = x^2 + x + 1$  is
  - one –one and onto
  - one –one and into
  - many–one and onto
  - many –one and into
- If  $\tan^{-1}x + \tan^{-1}3 = \tan^{-1}8$  then  $x = ?$ 
  - 1/3
  - 1/5
  - 3
  - 5
- The area of a triangle with vertices  $(-3, 0)$ ,  $(3, 0)$  and  $(0, k)$  is 9 sq. units. The value of  $k$  will be
  - 9
  - 3
  - 9
  - 6
- If  $P(A \cap B) = 70\%$  and  $P(B) = 85\%$ , then  $P(A/B)$  is equal to:
  - 17/14
  - 14/17
  - 7/8
  - 1/8
- The minimum value of  $Z = 3x + 5y$  subjected to constraints  $x + 3y \geq 3$ ,  $x + y \geq 2$ ,  $x, y \geq 0$  is:
  - 5
  - 7
  - 10
  - 11
- If a line has direction ratios  $2, -1, -2$ , determine its direction cosines:
  - $\frac{1}{3}, \frac{2}{3}, -\frac{1}{3}$
  - $\frac{2}{3}, -\frac{1}{3}, -\frac{2}{3}$
  - $-\frac{2}{3}, \frac{1}{3}, \frac{2}{3}$
  - None of the above

8. The scalar product of  $5\mathbf{i} + \mathbf{j} - 3\mathbf{k}$  and  $3\mathbf{i} - 4\mathbf{j} + 7\mathbf{k}$  is:
- 15
  - 15
  - 10
  - 10
9. What is the differential equation of the family of circles touching the y-axis at the origin?
- $2xyy' + x^2 = y^2$
  - $2xyy'' + x' = y^2$
  - $2xyy' - x^2 = y^2$
  - $xyy' + x^2 = y^2$
10. The area of the figure bounded by the curve  $y = \log_e x$ , the x-axis and the straight line  $x = e$  is
- $5-e$
  - $3+e$
  - 1
  - None of these
11. If there is an error of 2% in measuring the length of a simple pendulum, then percentage error in its period is
- 1%
  - 2%
  - 3%
  - 4%
12. The value of  $c$  in Rolle's Theorem for the function,  $f(x) = \sin 2x$  in  $[0, \pi/2]$  is
- $\pi/4$
  - $\pi/6$
  - $\pi/2$
  - $\pi/3$
13. The ratio of contributions made by the magnetic field and electric field components to the intensity of an EM wave is
- 1:1
  - $c:1$
  - $c^2:1$
  - $\sqrt{c}:1$
14. Which of the following phenomenon is used in optical fibre?
- Refraction
  - Diffraction
  - Scattering
  - Total Internal Reflection
15. Which of the following is an application of the Doppler Effect?
- Doppler Radius
  - Doppler Spectrometer
  - Doppler Velocimeter
  - All of the above

16. What happens to the kinetic energy of the emitted electrons when the light is incident on a metal surface?
- It varies with the frequency of light
  - It varies with the light intensity
  - It varies with the speed of light
  - It varies irregularly
17. Which of the following did Bohr use to explain his theory?
- Conservation of angular momentum
  - Conservation of Quantum frequency
  - Conservation of Mass
  - Conservation of Linear Momentum
18. If 10 % of a radioactive material decays in 5 days, then the amount of the original material left after 20 days is nearly.
- 60%
  - 75%
  - 70%
  - 66%
19. What happens when the frequency deviation is doubled in FM?
- Modulation is doubled
  - Modulation is halved
  - Carrier swing is halved
  - The modulation index is decreased
20. A charge  $Q$  is placed at the centre of the line joining two point charges  $+q$  and  $+q$  as shown in the figure. The ratio of charges  $Q$  and  $q$  is
- 
- 4
  - 1/4
  - 4
  - 1/4
21. A silver wire has a resistance of  $2.1 \Omega$  at  $27.5^\circ\text{C}$ , and a resistance of  $2.7 \Omega$  at  $100^\circ\text{C}$ . What is the temperature coefficient of resistivity of silver?
- 0.0059
  - 0.0039
  - 0.0129
  - 0.0159
22. What is the formula to find the work done in rotating the dipole in a uniform magnetic field from  $\theta_1$  to  $\theta_2$ ?
- $W = MB (\cos \theta_1 / \cos \theta_2)$
  - $W = MB (\cos \theta_1 + \cos \theta_2)$
  - $W = MB (\cos \theta_1 - \cos \theta_2)$
  - $W = M+B (\cos \theta_1 - \cos \theta_2)$

23. Which of the following laws is the consequence of the Law of conservation of energy?
- Lenz's Law
  - Ohm's Law
  - Archimedes Law
  - All of the above
24. What is the resistance and tolerance value of a resistor with four colors red, orange, green, and silver marked on it?
- $2.3\text{M}\Omega \pm 10\%$
  - $2.3\text{K}\Omega \pm 10\%$
  - $3.2\text{M}\Omega \pm 5\%$
  - $3.2\text{M}\Omega \pm 10\%$
25. The circuit shows the two inputs A and B inverted using the two NOT gates. Their output is again fed to the NOR gate. Find the output and identify the logic gate of the complete circuit?



- a) NAND b) NOR c) AND d) NOT

Sample Question - 1