**RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE, RAHARA, KOLKATA**

**Undergraduate Admission Test:** Computer Science Honours

**Full Marks : 75** **Time : 1 hour**

***(The symbols have their usual meanings)***

1. The maximum value of $Z = 3x + 4y$ subjected to constraints $x + y \leq 4$, $x \geq 0$ and $y \geq 0$ is:
   (a) 12 (b) 14 (c) 16 (d) None of the above

2. If P (A) = 0.8, P (B) = 0.5 and P (B|A) = 0.4, what is the value of P (A ∩ B)?
   (a) 0.32 (b) 0.25 (c) 0.1 (d) 0.5

3. If $A=\begin{pmatrix} 5 & 6 & 8 \\ 4 & 2 & 12 \\ 13 & 11 & 25 \end{pmatrix}$ then what is det(A)?
   (a) 18 (b) -56 (c) -120 (d) 70

4. Find the area of the triangle formed by the points (3, 2); (2, 6); and (5, 12)
   (a) 18 (b) 9 (c) 12 (d) 54

5. The value of c in Rolle's theorem for the function, $f(x) = \sin 2x$ in $[0, \pi/2]$ is
   (a) $\pi/4$ (b) $\pi/6$ (c) $\pi/2$ (d) $\pi/3$

6. If there is an error of 2% in measuring the length of a simple pendulum, then percentage error in its period is
   (a) 1% (b) 2% (c) 3% (d) 4%

7. Area bounded by the curve $y = \sin x$ and the x-axis between $x = 0$ and $x = 2\pi$ is
   (a) 2 sq. units (b) 3 sq. units (c) 4 sq. units (d) None of these

8. If $\int \sec^2(7 - 4x)dx = a \tan (7 - 4x) + C$, then value of a is
   (a) -4 (b) -¼ (c) 3 (d) 7

9. In If $xy \cdot yx = 16$, then dy/dx at (2, 2) is
   (a) 0 (b) 1 (c) -1 (d) None of these

10. Find the equation of the line that passes through the point (3, −2) and is perpendicular to the line $4x-3y+7=0$.
    (a) $3x+4y-1=0$ (b) $3x+4y-6=0$ (c) $3x-y+1=0$ (d) $3x+4y+6=0$

11. A box contains 7 red, 12 green, 15 blue, and 8 yellow balls. If two balls are drawn at random, what is the probability that both are blue?
    (a) 0.122 (b) 0.4 (c) 0.245 (d) 0.357

12. Solution of differential equation $x.dy - y.dx = Q$ represents:
    (a) A rectangular hyperbola (b) Parabola whose vertex is at the origin
    (c) Straight line passing through the origin (d) A circle whose centre is at the origin

13. A silver wire has a resistance of 2.1 Ω at 27.5 °C, and a resistance of 2.7 Ω at 100 °C. What is the temperature coefficient of resistivity of silver?
    (a)0.0059 (b) 0.0039 (c) 0.0129 (d) 0.0159

14. Which of the following statement is false for the properties of electromagnetic waves?
(a) Both electric and magnetic field vectors attain the maxima and minima at the same place and same time.
(b) The energy in electromagnetic waves is divided equally between electric and magnetic field vectors.
(c) Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of wave.
(d) These waves do not require any material medium for propagation.

15. Ultra-violet radiation of 6.2 eV falls on an aluminium surface having work-function 4.2 eV. The kinetic energy (in J) of the fastest electron emitted is nearly.
(a) $3 \times 10^{-19}$ (b) $3 \times 10^{-15}$ (c) $3 \times 10^{-17}$ (d) $3 \times 10^{-21}$

16. In an n-p-n transistor circuit the collector current is 18 mA. If 90% of the electrons emitted reach the collector, than the emitter current is:
(a) 1.6 mA (b) 16.4 mA (c) 18 mA (d) 20 mA

17. If two light waves of the same wavelength but different intensities interfere and the intensity of the resultant wave at a point is zero, which of the following must be true?
(a) The waves are out of phase by 90 degrees at that point
(b) The waves are out of phase by 180 degrees at that point
(c) The waves are in phase
(d) The waves have the same amplitude

18. A simple pendulum has a period of 2 seconds. What will be its period if it is taken to a planet where the acceleration due to gravity is four times that of Earth?
(a) 1 Second (b) 4 Second (c) 0.5 Second (d) 0.25 Second

19. If the two ends of a reverse biased p-n junction are joined by a wire
(a) There will be a steady current from the p-side to the n side
(b) There may or may not be a current depending upon the resistance of the connecting wire
(c) There will not be a steady current in the circuit
(d) There will be a steady current from the n-side to the p side

20. In which direction does the force act on a current-carrying wire placed in a magnetic field?
(a) Along the direction of the magnetic field (b) Parallel to the wire
(c) Opposite to the direction of the current (d) Perpendicular to the wire

21. A p-type semiconductor is
(a) Positively charged (b) Negatively charged (c) Uncharged (d) None of the above

22. What is the resistivity of a pure semiconductor at absolute zero?
(a) Zero (b) Infinity (c) Same as that of conductors at room temperature (d) Same as that of insulators at room temperature

23. What happens when the light is refracted into a medium?
(a) Both frequency and wavelength of the light increase (b) The wavelength increases but the frequency remains unchanged (c) Both wavelength and frequency decrease (d) The wavelength decreases but the frequency remains constant

24. The de-Broglie wavelength of an electron moving with a speed of $6.6 \times 10^{15}$ $ms^{-1}$ is nearly equal to
(a) $10^{-11}$m (b) $10^{-9}$ m (c) $10^{-7}$ m (d) $10^{-5}$ m

25. The angular resolution of a 10 cm diameter telescope at a wavelength of 5000 Å is of the order of
(a) $10^{6}$ rad (b) $10^{2}$ rad (c) $10^{-4}$ rad (d) $10^{-6}$ rad