03/09/2020-Shift 1

EE24BTECH11021 - Eshan Ray

16) The solution curve of the differential equation, $(1+e^{-x})\left(1+y^2\right)\frac{dx}{dy} = y^2$, which passes through the point $(0,1)$, is :
   a) $y^2 = 1 + y\log_e\left(\frac{1+e^{-x}}{2}\right)$
   b) $y^2 + 1 = y\left(\log_e\left(\frac{1+e^{-x}}{2}\right)+2\right)$
   c) $y^2 + 1 = y\left(\log_e\left(\frac{1+e^{x}}{2}\right)+2\right)$
   d) $y^2 = 1 + y\log_e\left(\frac{1+e^{x}}{2}\right)$

17) The area in (*insq.units*) of the region $\left\{(x,y) : 0 \le y \le x^2+1, 0 \le y \le x+1, \frac{1}{2} \le x \le 2\right\}$ is:
   a) $\frac{23}{16}$
   b) $\frac{79}{16}$
   c) $\frac{23}{6}$
   d) $\frac{79}{24}$

18) If α and β are the roots of the equation $x^2 + px + 2 = 0$ and $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ are the roots of the equation $2x^2 + 2qx + 1 = 0$, then $\left(\alpha - \frac{1}{\alpha}\right)\left(\beta - \frac{1}{\beta}\right)\left(\alpha + \frac{1}{\beta}\right)\left(\beta + \frac{1}{\alpha}\right)$ is equal to:
   a) $\frac{9}{4}\left(9+p^2\right)$
   b) $\frac{9}{4}\left(9+q^2\right)$
   c) $\frac{9}{4}\left(9-p^2\right)$
   d) $\frac{9}{4}\left(9-q^2\right)$

19) The lines $\vec{r} = \left(\hat{i}-\hat{j}\right) + l\left(2\hat{i}+\hat{k}\right)$ and $\vec{r} = \left(2\hat{i}-\hat{j}\right) + m\left(\hat{i}+\hat{j}+\hat{k}\right)$
   a) do not intersect for any values of l and m
   b) intersect when $l = 1$ and $m = 2$
   c) intersect when $l = 2$ and $m = \frac{1}{2}$
   d) intersect for all values of l and m

20) Let $[t]$ denote the greatest integer $\le t$. If for some $\lambda \in R - \{0,1\}$, $\lim_{x\to 0}\left|\frac{1-x+|x|}{\lambda - x + [x]}\right| = L$, then L is equal to:
   a) 0
   b) 2
   c) $\frac{1}{2}$
   d) 1

21) If $\lim_{x\to 0}\left\{\frac{1}{x^8}\left(1-\cos\frac{x^2}{2}-\cos\frac{x^2}{4}+\cos\frac{x^2}{2}\cos\frac{x^2}{4}\right)\right\} = 2^{-k}$, then the value of k is ...

22) The diameter of the circle, whose centre lies on the line $x+y = 2$ in the first quadrant and which touches both the lines $x = 3$ and $y = 2$, is...

23) The value of $(0.16)^{\log_{2.5}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}...to\infty\right)}$ is equal to ...

24) Let $A = \begin{pmatrix} x & 1 \\ 1 & 0 \end{pmatrix}, x \in R$ and $A^4 = \left[a_{ij}\right]$. If $a_{11} = 109$, then a_{22} is equal to ...

25) If $\left(\frac{1+i}{1-i}\right)^{m/2} = \left(\frac{1+i}{i-1}\right)^{n/3} = 1, (m, n \in N)$ then the greatest common divisor of the least values of m and n is ...