Assignment - 2

EE24BTECH11039 - Mandala Ranjith

1 MCQ's with One Correct Answer

1) The differential equation whose solution is $Ax^2 + By^2 = 1$ where A and B are arbitrary constants is of

   a) second order and second degree
   b) first order and second degree
   c) first order and first degree
   d) second order and first degree

[2006]

2) The differential equations of all the circles passing through the origin and having their centres on x-axis is

   a) $y^2 = x^2 + 2xy\frac{dy}{dx}$
   b) $y^2 = x^2 - 2xy\frac{dy}{dx}$
   c) $x^2 = y^2 + xy\frac{dy}{dx}$
   d) $x^2 = y^2 + 3xy\frac{dy}{dx}$

[2007]

3) The solution of the differential equation $\frac{dy}{dx} = \frac{x+y}{x}$ satisfying the condition $y(1) = 1$ is

   a) $y = \ln x + x$
   b) $y = x \ln x + x^2$
   c) $y = xe^{(x-1)}$
   d) $y = x \ln x + x$

[2008]

4) The differential equation which represents the family of curves $y = c_1 e^{c_2 x}$, where c_1 and c_2 are arbitrary constants,is

   a) $\frac{d^2y}{dx^2} = y\frac{dy}{dx}$
   b) $y\frac{d^2y}{dx^2} = \frac{dy}{dx}$
   c) $y\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$
   d) $\frac{dy}{dx} = y^2$

[2009]

5) Solutions of the differential equation $\cos x dy = y(\sin x - y)dx, 0 < x < \frac{\pi}{2}$ is

   a) $y \sec x = \tan x + c$
   b) $y \tan x = \sec x + c$
   c) $\tan x = (\sec x + c)y$
   d) $\sec x = (\tan x + c)y$

[2010]

6) If $\frac{d^2y}{dx^2} = y + 3$ and $y(0) = 2$, then $y(\ln 2)$ is equal to:

a) 5

c) −2

b) 13

d) 7.

7) Let be the purchase value of an equipment and $V(t)$ be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation $\frac{dV_{(t)}}{dt} = -k(T - t)$. where k is a constant and T is the total life in years of the equipment.Then the scrap value $V(T)$ of the equipment is

a) $l - \frac{kT^2}{2}$

c) e^{-kT}

b) $l - \frac{k(T-t)^2}{2}$

d) $T^2 - \frac{1}{k}$

8) The population $p(t)$ at time of a certain mouse species satisfies the differential equation $\frac{dp_{(t)}}{dt} = 0.5p(t) - 450$. If $p(0) = 850$,then the time at which the population becomes zero is:

a) $2 \ln 18$

c) $\frac{1}{2} \ln 18$

b) $2 \ln 9$

9) At present , a firm is manufacturing 2000 times.It is estimated that the rate of change of production P with respect to additional number of workers x is given by $\frac{dP}{dx} = 100 - 12\sqrt{x}$.If the firm employs 25 more workers,then the new level of production of items is

a) 2500

c) 3500

b) 3000

d) 4500

10) Let the population of rabbits surviving at time t be governed by the differential equation $\frac{dp_{(t)}}{dt} = \frac{1}{2}p(t) - 200$.IfP(0)=100,then p(t) equals:

a) $600 - 500e^{\frac{t}{2}}$

c) $400 - 300e^{\frac{t}{2}}$

b) $400 - 300e^{\frac{-t}{2}}$

d) $300 - 200e^{\frac{-t}{2}}$

11) Let $y(x)$ be the solution of the differential equation $(x \log x)\frac{dy}{dx} + y = 2x \log x, (x \geq 1)$.Then $y(e)$ is equal to:

a) 2

c) e

b) $2e$

d) 0

12) If the curve $y = f(x)$ passes through the point $(1, 1)$ and satisfies the differential equation,$y(1 + xy)dx = xdy$, then $f\left(\frac{-1}{2}\right)$ is equals to

a) $\frac{2}{5}$

b) $\frac{4}{5}$

c) $\frac{2}{5}$

d) $\frac{4}{5}$

13) If $(24\sin x)\frac{dy}{dx} + (y+1)\cos x = 0$ and $y(0) = 1$ then $y\left(\frac{\pi}{2}\right)$ is equal to

a) $\frac{4}{3}$

b) $\frac{1}{3}$

c) $\frac{2}{3}$

d) $\frac{1}{3}$

14) Let $y = y(x)$ be the solution of the differential equation $\sin x \frac{dy}{dx} + y\cos x = 4x, x \in (0,2)$. If $y\left(\frac{\pi}{2}\right) = 0$, then $y\left(\frac{\pi}{6}\right)$ is equal to

a) $\frac{-8}{9\sqrt{3}}\pi^2$

b) $\frac{-8}{9}\pi^2$

c) $\frac{-4}{9}\pi^2$

d) $\frac{4}{9\sqrt{3}}\pi^2$

15) If $y = y(x)$ is the differential equation $\sin x \frac{dy}{dx} + 2y = x^2$ satisfying $y(a) = 1$, then $y\left(\frac{1}{2}\right)$ is equal to

a) $\frac{7}{64}$

b) $\frac{1}{4}$

c) $\frac{49}{16}$

d) $\frac{13}{16}$

16) The solution of the differential equation $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$ with $y(1) = 1, is$:

a) $y = \frac{4}{5}x^3 + \frac{1}{5x^2}$

b) $y = \frac{x^3}{5} + \frac{1}{5x^2}$

c) $y = \frac{x^2}{4} + \frac{3}{4x^2}$

d) $y = \frac{3}{4}x^2 + \frac{1}{4x^2}$