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Student ID: _____

NAVRACHANA UNIVERSITY
SLSE, BSc PROGRAMME
END SEMESTER EXAMINATION
1st Year, Semester -I
Academic Year 2017 – 2018

Subject: Integral Calculus and Differential Equation

Course Code: MA122

Date: 22/11/2017

Marks: 40

Time: 10:30 AM – 12:30 PM

Q-1) Multiple choice questions.

(6X2=12)

1) If $f: \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function satisfying $f(x) + f(3 - x) = 4$, then

$\int_0^3 f(x) dx$ is equal to

a) 3

b) 4

c) 6

d) 8

2) The value of $\int \frac{dx}{e^x + 1}$ is

a) $\log(e^x - 1) + c$

b) $\log(e^x + 1) + c$

d) $x - \log(e^x + 1) + c$

d) None of these.

3) $\int_{\pi/4}^{\pi/2} \frac{\cos x}{\sin x} dx$ is

a) $\ln\sqrt{2}$

b) $\ln \frac{\pi}{4}$

c) $\ln\sqrt{3}$

d) $\ln \frac{\sqrt{3}}{2}$

4) Physically, integrating $\int_a^b f(x) dx$ means

a) Area under the curve from a to b

b) Area to the left of point a

c) Area to the right of point b

d) Area above the curve from a to b

5) The area of a circle of radius a can be found by the following integral

a) $\int_0^a (a^2 - x^2) dx$ b) $\int_0^{2\pi} \sqrt{a^2 - x^2} dx$ c) $4 \int_0^a \sqrt{a^2 - x^2} dx$ d) $\int_0^a \sqrt{a^2 - x^2} dx$

6) The value of the integral $\int_{-\pi/2}^{\pi/2} \sqrt{\frac{1 - \cos x}{1 + \cos x}} dx$ is equal to

a) 0

b) $2\log 2$

c) π

d) $\frac{1}{2} \log 2$

Q-2) Do as directed.(Attempt any four)

(4X3=12)

- 1) Solve $\int \frac{1+x^2}{1+x^4} dx$.
- 2) Define order and degree of an differential equation with an example.
- 3) Find differential equation of the family of curves $y = e^x(A \cos x + B \sin x)$.
Where A and B are arbitrary constants.
- 4) Solve $\frac{dy}{dx} = \frac{\sin x + x \cos x}{y(2 \log y + 1)}$.
- 5) Prove that $I = \int_0^{\pi} \frac{x \sin x dx}{1 + \cos^2 x} = \frac{\pi^2}{4}$.

Q-3) Do as directed. (Attempt any four)

(4X4=16)

- 1) Solve $\int \frac{x^2+1}{(x+2)^3(x-1)}$
- 2) $\int_0^{\pi/2} \sin 2x \log (\tan x) dx$
- 3) Solve $x^2(x^2 - 1) \frac{dy}{dx} + x(x^2 + 1)y = (x^2 - 1)$
- 4) Solve $x \sin x \frac{dy}{dx} + (x \cos x + \sin x)y = \sin x$.
- 5) $\frac{dy}{dx} + 3x^2y = x^5e^{-3}$.