

Student ID: _____

NAVRACHANA UNIVERSITY
SBL, BCA PROGRAMME
END SEMESTER EXAMINATION
1st Year, Semester - I
Academic Year 2017 - 2018

Subject: MATHEMATICAL FOUNDATIONS

Course Code: MA103

Marks: 40

Date: 24/11/2017

Time: 10:30AM - 12:30PM

Instructions:

- Calculator is permitted.
- Write answers in answer book only (DO NOT WRITE ANYTHING ON QUESTION PAPER).

Q-1 Answer the following questions

(8x1=8 marks)

1. If $f(x) = \cos x + \frac{2}{x} - e^x$ then $\int f(x) dx =$ _____

- a. $\sin x + 2 \log x - xe^x$
- b. $\sin x + 2 \log x - e^x$
- c. $-\sin x + 2 \log x - xe^x$
- d. $-\sin x + 2 \log x - e^x$
- e. None of the given

2. Evaluate: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x dx =$ _____

- a. 0
- b. 2
- c. $-\cos 2$
- d. $\sin 2$
- e. None of the given

3. $\int_0^1 \frac{2x}{1+x^2} dx =$ _____

- a. $\log 2$
- b. $\log x$
- c. $\log 3$
- d. 0
- e. None of the given

4. $\int xe^x dx =$ _____

- a. $1 + e^x$
- b. e^x
- c. $x(1 + e^x)$
- d. $e^x(1 + x)$
- e. None of the given

5. The differential equation of the family of curves $y = e^x(A \cos x + B \sin x)$, where A and B are arbitrary constants, is:

- a. $\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 2y = 0$
- b. $\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + 2y = 0$
- c. $\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^2 + y = 0$
- d. $\frac{d^2y}{dx^2} - 7 \frac{dy}{dx} + 2y = 0$
- e. None of the given

6. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \sqrt{x + \left(\frac{dy}{dx}\right)^3} = 0$ is:

- a. (2, 2)
- b. (3, 2)
- c. (2, 3)
- d. (1, 3)
- e. None of the given

7. The approximate value of $\sqrt[5]{33} =$ _____

- a. 2.0120
- b. 2.0125
- c. 2.0123
- d. 2.0124
- e. None of the given

8. Evaluate: $\int_a^b \sin x dx =$ _____

- a. $\cos b - \cos a$
- b. $\sin b - \sin a$
- c. $\cos a - \cos b$
- d. $\sin a - \sin b$
- e. None of the given

Q-2 Answer the following questions (Any Four)

(4X8=32 marks)

1. Integrate:

a. $e^x \sin e^x$

b. $\frac{\log x}{x^3}$

2. Integrate first changing the variable and then integrating by parts

a. $\int e^{\sqrt{x}} dx$

b. $\int \sin^3 \sqrt{x} dx$

3. In the given problem evaluate the integral $\int \frac{x}{(x+1)(2x+1)} dx$

4. Differentiate the given function using the rules for logarithmic differentiation

a. $y = x^{x^x}$

b. $y = (\sin x)^{\cos x}$

5. Solve the given differential equation $y(1+x)dx + x(1+y)dy = 0$.

6. Show that $Ax^2 + Bx^2 = 1$ is the solution of $x \left[y \frac{d^2y}{dx^2} + \left(\frac{dy}{dx} \right)^2 \right] - y \frac{dy}{dx} = 0$.