Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Department of Mathematics

, School of advanced sciences

Fall Semester 2021-2022

Continuous Assessment Test - II (December 2021)

Slot: E2+TE2   **Class No.** VL2021220106088

Course Code: BMAT101L   **Course Title:** Calculus

Faculty: Dr. Raghavendar. K (13429)   **School:** SAS

Answer all the questions

1(a) **Easy**   10 marks   **CO1**   **BL3**

Find second order Taylor polynomial of $f(x, y) = x^2 \sinh(2x + y) + xy$ about $(0, 1)$.

1(b) **Easy**   10 marks   **CO1**   **BL3**

Find second order Taylor polynomial of $f(x, y) = y^2 \sinh(2x + y) + xy$ about $(1, 0)$.

1(c) **Easy**   10 marks   **CO1**   **BL3**

Find second order Taylor polynomial of $f(x, y) = x^2 \sinh(x + 2y) + xy$ about $(0, 1)$.

1(d) **Easy**   10 marks   **CO1**   **BL3**

Find second order Taylor polynomial of $f(x, y) = y^2 \sinh(x + 2y) + xy$ about $(1, 0)$.

2(a) **Medium**   10 marks   **CO1**   **BL3**

Evaluate the integral $\int_0^1 \int_{x^2}^1 \left(x^3 e^{y^3} + x\right) \, dy\, dx$ by changing the order of the integration.

2(b) **Medium**   10 marks   **CO1**   **BL3**

Evaluate the integral $\int_0^1 \int_{x^2}^1 \left(x^3 e^{y^3} + y\right) \, dy\, dx$ by changing the order of the integration.

2(c) **Medium**   10 marks   **CO1**   **BL3**

Evaluate the integral $\int_0^1 \int_{x^2}^1 \left(x^3 e^{y^3} + x^3\right) \, dy\, dx$ by changing the order of the integration.

2(d) **Medium**   10 marks   **CO1**   **BL3**

Evaluate the integral $\int_0^1 \int_{x^2}^1 \left(x^3 e^{y^3} + y^3\right) \, dy\, dx$ by changing the order of the integration.

3(a) **Tough**   10 marks   **CO2**   **BL5**

(i) Construct a triple integral and hence evaluate the volume of the region V bounded by the paraboloid $z = 9 - x^2 - y^2$ and the $xy-$plane.

(ii) Let

$$I = \int_0^4 \int_0^{(4-x)/2} \int_0^{(12-3x-6y)/4} f(x, y, z)\, dz\,dy\,dx.$$

Rewrite the order of the integration in I as $dx\, dy\, dz$.

3(b) **Tough**   10 marks   **CO2**   **BL5**

(i) Construct a triple integral and hence evaluate the volume of the region V bounded by the paraboloid $z = 16 - x^2 - y^2$ and the $xy-$plane.

(ii) Let

$$I = \int_0^{12} \int_0^{(12-x)/6} \int_0^{(12-x-6y)/4} f(x, y, z)\, dz\,dy\,dx.$$

Rewrite the order of the integration in I as $dx\, dy\, dz$.

3(c) **Tough**   10 marks   **CO2**   **BL5**

(i) Construct a triple integral and hence evaluate the volume of the region V bounded by the paraboloid $z = 25 - x^2 - y^2$ and the $xy-$plane.

(ii) Let

$$I = \int_0^4 \int_0^{12-3x} \int_0^{(12-3x-y)/4} f(x, y, z)\, dz\,dy\,dx.$$

Rewrite the order of the integration in I as $dx\, dy\, dz$.

3(d) **Tough**   10 marks   **CO2**   **BL5**

(i) Construct a triple integral and hence evaluate the volume of the region V bounded by the paraboloid $z = 36 - x^2 - y^2$ and the $xy-$plane.

(ii) Let

$$I = \int_0^4 \int_0^{(12-3x)/6} \int_0^{12-3x-6y} f(x, y, z)\, dz\,dy\,dx.$$

Rewrite the order of the integration in I as $dx\, dy\, dz$.