POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE

Name of Student: Enrollment No.

Department:

BENNETT UNIVERSITY, GREATER NOIDA SUPPLEMENTARY EXAMINATION, DECEMBER 2019

COURSE CODE: EMAT101L

MAX. DURATION: 2 Hours

COURSE NAME: Engineering Calculus

COURSE CREDIT: 3-1-0

MAX. MARKS: 100

Instructions:

- All questions are mandatory.
- Space for rough work is provided at the end.
- Please write down the solution in the given space.
- 1. Find the limit of the following sequences:

[5+5]

(a)
$$a_n = \frac{1}{n}\sin^2 n + 3\left(1 + \frac{2}{n}\right)^n \ \forall \ n \in \mathbb{N}.$$
 Answer:

(b)
$$a_n = \frac{1}{(n+1)^2} + \frac{1}{(n+2)^2} + \dots + \frac{1}{(n+n)^2} \ \forall \ n \in \mathbb{N}.$$
Answer:

2. Determine which of the following series converges/diverges! [5+5](b) $\sum_{n=1}^{\infty} \frac{n!}{(2n+1)!}$ Answer: REPORT UNIVERSITY GREATHR NORM MAK DEPAHON 2 Hold. COPERAC CRADE ENAMED COURSE SAME Pagant of a Colonial Control of the COURSE CERTAIN & FU PROPERTY OFF richilletker for sportsenjellA 🛊 lace has as believe refer down against not semific 💌 many and a children in the south of the confidence 73 1 2" requestions of the free with building The second secon

3. Find the critical points and their nature of the function $f(x,y) = 2(x-4)^2 + 3(y-7)^2$. [5] Answer:

4. Find all the critical points of the function $f(x,y) = \sin x \sin y$, for all $-2 \le x, y \le 2$. [5]

Answer:

5. Calculate $L(P_n, f)$ and $U(P_n, f)$ where $f(x) = x^2$, and $P_n = \{0, \frac{1}{n}, \frac{2}{n}, ..., \frac{n-1}{n}, \frac{n}{n}\}$. Then show that f is Riemann integrable on [0, 1].

[8] Answer:

6. Do any TWO of the following:

 $[2\times 6=12]$

- (a) Determine if f' is continuous at 0 for the following function $f(x) = \begin{cases} x^2 \cos \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$.
- (b) Show that $\lim_{x\to 0} \sin\left(\frac{1}{x^2}\right)$ does not exist.
- (c) Evaluate $\int_0^{\pi/2} \sqrt{\tan x} dx$ using Beta and Gamma integral.

Answer:

Calculate $L(B_n,f)$ and $L(F_n,f)$ where $f(x)=x^2$, and $F_n=\{0,\frac{1}{n},\frac{3}{n},\dots,\frac{n-1}{n},\frac{n}{n}\}$. Thus show that f is Bloman a integrable on (0,1).

7. Let $f: \mathbb{R}^2 \to \mathbb{R}$ be defined as

$$f(x,y) = \begin{cases} \frac{xy^2}{x^2 + y^4} & \text{if } (x,y) \neq (0,0), \\ 0 & \text{if } (x,y) = (0,0). \end{cases}$$

Examine

(a) Continuity of f at $(0,0)$.				[3]
(b) Existence of the directional deriv	vatives $D_{u}f$ at	t(0,0) along e	ach unit vector u .	[3]
(c) Differentiability of f at $(0,0)$.		ALIGAT IA		[4]

8. Evaluate the following integral:

(a)
$$\iint_R x^2 dA$$
 where R is the region bounded by $y = x^2, y = x + 2$. [5]
(b) $\int_0^{\ln 3} \int_1^{\ln 4} e^{3x+2y} dy dx$. [5]

(b)
$$\int_0^{\ln 3} \int_1^{\ln 4} e^{3x+2y} dy dx$$
. [5]

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Answer:

- 9. Check whether the following statements are true/false. Justify your answer. $[3 \times 5 = 15]$
 - (a) Every continuous function is differentiable function.

 Answer:
 - (b) If |f| is Riemann integrable then f is Riemann integrable. Answer:
 - (c) $|\cos 4x| |\cos 4y| > 4|x y|$ for every value $x, y \in \mathbb{R}$. Answer:

- (d) Every monotonic sequence is convergent. **Answer:**
- (e) The series $\sum_{n=1}^{\infty} n^{\frac{1}{n}}$ converges. Answer:

 $\int_{1}^{\infty} \frac{dx}{x^{\frac{1}{2}}} \text{ converges. Then within a solutional state and the problem is the last solution of the last solution of the last solution and the last solution of the last solution$ ानकार है के के राज्यात माने माने हैं का अपने में किल में कि में महाराज्या है है है

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10. Fill in the blanks.

Fill in the blanks.
$$(2^n)^n = 10$$
(a) $\bigcap_{n \in \mathbb{N}} \left(-\frac{1}{n}, \frac{1}{n} \right) = \dots$

respectively.

(d) Supremum and Infimum of the set $S = \{a_n : n \in \mathbb{N}\}$ where $a_n = \begin{cases} \frac{1}{2^n}, & \text{if } n \text{ is odd} \\ \frac{1}{3^n}, & \text{if } n \text{ is even} \end{cases}$ Survey are entitled in the state of the are respectively.

(e) All the critical points of $f(x,y) = 2 + 2x + 2y - x^2 - y^2$ are.....

11. Give an example of a function which is discontinuous at every point of $\mathbb R$ but modulus of the function is continuous in \mathbb{R} . Answer:

SPACE FOR ROUGH WORK

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