

BRAINWARE UNIVERSITY Term End Examination 2020 - 21

Programme – Bachelor of Technology in Electronics & Communication Engineering

Course Name – Calculus

Course Code - BSC(ECE)101 Semester / Year - Semester I

Time allotted : 75 Minutes

Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 60=60

1. (Answer any Sixty)

(i)

If f(x) satisfy all the conditions of Rolle's theorem in [a, b], then f'(x) becomes zero

a)

only at one point in (a, b) c)

at two points in (a,b) d)

none of these

b)

at least one point in (a,b)

(ii)

If f(x) is continuous on [2,2+h] and derivable in (2,2+h), then $f(2+h) = f(2) + hf'(2+\theta h)$, where

a) b)

 θ is any real number $-1 < \theta < 1$

c) d)

$$\theta > 0$$
 $0 < \theta < 1$

(iii)

$\int_{-\pi}^{\pi} \sin 6x dx =$	
a) 0	b)
c) -1	d)

b) 1 d)

none of these

b)

 $\sqrt{\pi}$

d)

 $\frac{\pi}{2}$

(iv)

$$\int_{0}^{\infty} e^{-x^{2}} dx =$$
a)
$$\pi$$
c)
$$\frac{\sqrt{\pi}}{2}$$

(v)

For
$$k > 0$$
, $n > 0 \int_{0}^{\infty} e^{-kt} t^{n-1} dt =$
a) b)

$$\frac{\Gamma(n)}{k^n}$$

 $\frac{\Gamma(k)}{n^n}$

(vi)

For
$$m > 0$$
, $n > 0$ $B(m+1, n) =$

a)

$$\frac{m}{m+1}B(m,n)$$
c)

$$\frac{n}{m+1}B(m,n)$$

$$\frac{m}{m+n}B(m,n)$$

d)

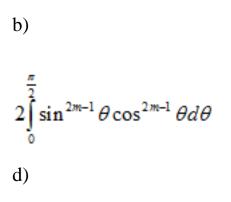
None of these

(vii)

For m > 0, n > 0 B(m, n) =

a)
$$2\int_{0}^{\frac{\pi}{2}}\sin^{2m-1}\theta\cos^{2n-1}\theta d\theta$$

c)

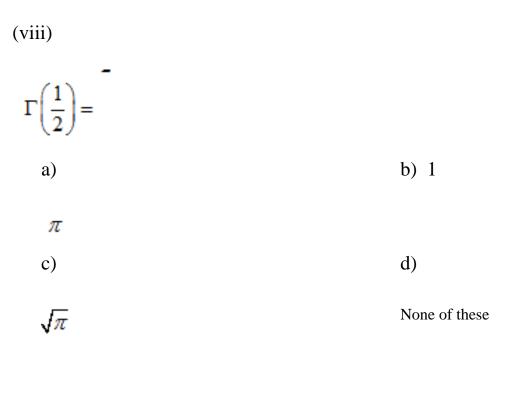


None of these



d) None of these

$$2\int_{0}^{\frac{\pi}{2}}\sin^{2n-1}\theta\cos^{2m-1}\theta d\theta$$



$\lim_{x \to 0+} x \log x =$	
a) 1	b) 0
c) 2	d)

None of these

(x)

If a function $f:[a,b] \to \mathbb{R}$ be continuous on [a,b] and differentiable on (a,b). If f'(x) = 0 for all $x \in (a,b)$ then the value of f is

- a) 1 b) 0
- c) d)

Constant

None of these

(xi)

The Cauchy's form of remainder in Taylor's theorem is a)

$$\frac{h^n(1-\theta)^{(n-1)}}{(n-1)!}f^n(a+\theta h)$$

c)

$$\frac{h^n}{n!}f^n(a+\theta h)$$

b)

$$\frac{h^n(1-\theta)^{(n-p)}}{p(n-1)!}f^n(a+\theta h)$$

d)

None of these

(xii)

The Lagrange's form of remainder in Maclaurin's theorem is a) b)

$$\frac{x^{n}(1-\theta)^{(n-1)}}{(n-1)!}f^{n}(\theta x)$$
c)

 $\frac{x^n}{n!}f^n(\theta x)$

$$\frac{x^n(1-\theta)^{(n-p)}}{p(n-1)!}f^n(\theta x)$$

d)

None of these

(xiii)

$$\int_{0}^{1} \frac{1}{\sqrt{1-x^{2}}} dx =$$



(xiv)

The improper integral
$$\int_{0}^{1} \frac{\sin \frac{1}{x}}{\sqrt{x}} dx$$
 is
a)

Convergent c) 1

b)

Divergent d)

None of these

(xv)

The improper integral
$$\int_{-\infty}^{\infty} \frac{1}{1+x^2} dx =$$
a)
$$\pi$$
c)
$$\frac{\pi}{2}$$

None of these

b) 1

d)

(xvi)

The improper integral
$$\int_{1}^{\infty} \frac{1}{x(1+x^2)} dx$$
 is

a)

Convergent c) 1

b)

Divergent d)

None of these

(xvii)

The improper integral
$$\int_{1}^{\infty} f(x) dx$$
, where $f(x) = \begin{cases} \frac{1}{x^2}, & \text{if } x \text{ be rational} \ge 1 \\ -\frac{1}{x^2}, & \text{if } x \text{ be irrational} > 1 \end{cases}$ is
a)
b)
Convergent
c) 1
Divergent
d)

None of these

(xviii)

The characteristic points of the circles $(x - \alpha)^2 + y^2 = \alpha^2$ are

a) b)

$$(\alpha, \pm a)$$
 $(\pm \alpha, a)$

c) d)

$$(\pm \alpha, -a)$$

(xix)

The sequence
$$\left\{\frac{1}{3^n}\right\}$$

a)

Monotonic increasing

c)

Monotonic decreasing

(xx)

$\mathrm{If} {\textstyle \sum_{n=1}^{\infty} x_n}$	is convergent, then the series	$\textstyle \sum_{n=1}^k u_n + \sum_{n=1}^\infty x_n$	is
a)		b)	
convergent c)		divergent d)	
oscillatory		nothing can be said	

(xxi)

Second term of sequence with general term n^2 - 4/2 is

a) 2 b) -3

None of these

b)

Oscillatory

d)

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None of these
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(xxii)

Sum of an infinite geometric series exist only if condition on common ratio r is a) b)

 -1 < r < 1 $-1 \le r \le 1$

 c)
 d)

 r < -1, r > 1 $r \le -1, r \ge 1$

(xxiii)

The Sequence $\left\{1, \frac{1}{5}, \frac{1}{5^2}, \dots, \frac{1}{5^n}, \dots, \infty\right\}$ isa)b)divergentoscillatoryc)onvergentconvergentnone of these

(xxiv)

The sequence $\{4,4,4,...\}$ is called a

a)
Monotone increasing sequence
c)
Constant sequence
Monotone decreasing sequence
d)

(xxv)

The sequence $\{x_n\}$, where $x_n = (-1)^{n-1}$, is a) b) a convergent sequence a divergent sequence c) d) None of these an oscillatory sequence (xxvi) The sequence $\{x_n\}$, where $x_n = \frac{1}{2} \{1 + (-1)^{n-1}\}$, is a sequence with b) a) 2 terms n terms d) c) No terms None of these (xxvii) The sequence $\left\{1, \frac{1}{2}, \frac{1}{3}, \dots, \frac{1}{n}, \dots\right\}$ is a) b) Bounded Unbounded c) d) Divergent None of these (xxviii)

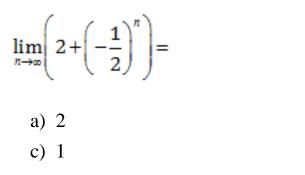
The sequence $\left\{\frac{1}{n}\right\}$ is

a)

Convergent sequence c)

Oscillating sequence

(xxix)



b)

Divergent sequence d)

None of these

b) 0d)

None of these

(xxx)

The sequence $\left\{\frac{1}{n^p}\right\}$, where p > 0 is a)

b)

Divergent sequence d)

Constant sequence

Null sequence

(xxxi)

c)

None of these

For $ x > 1$ and $p > 0$,	$\lim_{n\to\infty}\frac{x^n}{n!}=$
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- a) 0
- c) 2

b) 1d)

None of these

(xxxii)

The sequence $\{(-1)^n\}$ is

a)

Bounded sequence c)

Convergent sequence

(xxxiii)

A convergent sequence is a)

Bounded sequence c)

Oscillating sequence

(xxxiv)

The sequence	$\left\{\frac{n^2+1}{n^2}\right\}$	converges to

a)	0	b) 1
c)	1/2	d)

Unbounded sequence d)

None of these

b)

b)

Unbounded sequence d)

None of these

None of these

(xxxv)

a)

The sequence $\{-n^2\}$ is

Convergent c)

Divergent

(xxxvi)

 $\lim_{a \to a} a^{\frac{1}{n}} = 1 \text{ if}$

0 < *a* < 1

c)

a > 0

(xxxvii)

The sequence $\left\{\frac{n}{n+1}\right\}$ is a)

An unbounded sequence c)

b)

Bounded d)

None of these

b)

 $|r| \leq 1$

d)

None of these

b)

Anoscillating sequence d)

A convergent sequence

None of these

(xxxviii)

The series $1 + a + a^2 + \dots$ is convergent only when

a)	b)
a < 1	$ a \leq 1$
c)	d)
$ a \ge 1$	None of these

(xxxix)

The series $\sum \frac{1}{n^p}$ is convergent for	
a) p>1	b)
	<i>p</i> ≤1
c) $p = 0$	d)

None of these

(xl)

The series $\sum u_n$, where $u_n = \sqrt{n^4 + 1} - \sqrt{n^4 - 1}$ is

a)	b)
Convergent c)	Divergent d)

Absolutely divergent

None of these

(xli)

For n>0, $\int_{-\pi}^{\pi} \cos nx dx =$ a) 1 c) 3π

 4π

b) 0

d)

(xlii)

Take the "odd function" out:

a) b) f(x) = x f(x) = |x|c) d) $f(x) = x \sin x$ $f(x) = e^{-|x|}$

(xliii)

If
$$f(x, y) = 0$$
, then $\frac{dy}{dx} =$
a) b)
 $\frac{f_x}{f_y}$
 f_y
 f_x
 f_y
d)

$$-\frac{f_x}{f_y}$$
 $-\frac{f_y}{f_x}$

If
$$u = \log \frac{x^2}{y}$$
 then $xu_x + yu_y =$
a) u
b) b
c) 1
d) 2u

(xlv)

If
$$u(x,y) = yf(\frac{x^2}{y^2})$$
 then show that $x\frac{\delta u}{\delta x} + y\frac{\delta u}{\delta x} =$

2u(x,y)

c) d) 2

u(x,y)

(xlvi)

 $\int_{2}^{3} \int_{4}^{6} dx dy =$

(xlvii)

$$\int_{0}^{1} \int_{y}^{y} dx dy =$$

a) 1/2 b) 1/6

c) 2/3 d) 4/3

(xlviii)

The value of
$$\iint_{R} xy(x^{2} + y^{2}) dxdy$$
 over $R: [0, a; 0, b]$.
a) b)
 $ax^{2}/_{2} - x^{5}/_{30}$ $ax^{2}/_{2} - x^{3}/_{6}$
c) d)
 $ax^{2}/_{2}$ $\frac{1}{8}a^{2}b^{2}(a^{2} + b^{2})$

(xlix)

Find the value of $\iint xydxdy$ over the area bounded by the parabola x = 2aand $x^2 = 4ay$, is a) b) $\frac{a^4}{4}$ c) d)

$$\frac{a^2}{3}$$
 $\frac{a^2}{3}$

(l)

The value of $\iiint xyzdxdydz$ over R:[0,1;0,1;0,1] is

a)	b)
$-\frac{2}{3} a^4$	-4⁄3 a4
c)	d)
$\frac{1}{8}$	$-2/_{3} a^{5}$

(li)

The value of $\iint_{R} x^{3} y dx dy$ over the region $R : \{0 \le x \le 1; 0 \le y \le 2\}$ is a) 1/2b) 8/945c) 16/45d) 16/945

(lii)

The value of $\int (xdx - dy)$, where C is the line joining (0,1) to (1,0) is c a) 3/2b) 1/2c) 0 d) 2/3

(liii)

If $\vec{a} \cdot (\vec{b} \times \vec{c}) = 0$, then the vectors \vec{a} , \vec{b} and \vec{c} are

independent c)

collinear

none of these

coplanar d)

b)

(liv)

a)

If θ be the angle between the vectors $\vec{a} = 6\hat{i} + 2\hat{j} + 3\hat{k} & \vec{b} = 2\hat{i} - 9\hat{j} + 5\hat{k}$ then

$$\theta = \cos^{-1}\left(\frac{9}{7\sqrt{110}}\right)$$
 $\theta = \tan^{-1}\left(\frac{12}{77}\right)$
c) both (a) and (b) d) none of these

(lv)

If
$$u = x^{4} + 4y^{3}z$$
, then $grad(u) =$
a)
 $4x^{3}\hat{i} + 12y^{2}z\hat{j} + 4y^{3}\hat{k}$
c)
 $4x^{3}\hat{i} + 12yz\hat{j} + 4y^{2}\hat{k}$
 $4x^{3}\hat{i} + 12yz\hat{j} + 4y^{2}\hat{k}$
b)
 $4x^{3}\hat{i} + 12y^{2}z\hat{j} + 4y^{2}\hat{k}$
d)
 $4x\hat{i} + 12yz\hat{j} + 4y^{2}\hat{k}$

(lvi)

$$\vec{A} = 2xz^{2}\hat{i} - yz\hat{j} + 3xz^{3}\hat{k} \text{ and } \phi = x^{2}yz, \text{ then } cwrl(cwrl\vec{A}) =$$
a)
b)
$$(-4x - 9z^{2})\hat{i} + (4z + 1)\hat{k} \qquad (-4x + 9z^{2})\hat{i} + (4z - 1)\hat{k}$$
c)
$$(-4x - 9z^{2})\hat{i} - (4z + 1)\hat{k} \qquad (-4x + 9z^{2})\hat{i} - (4z + 1)\hat{k}$$

(lvii)

If
$$\phi(x, y, z) = xy + yz + zx$$
, then $\overline{\nabla} \phi =$
a)
 $(y+z)\hat{i} + (z+x)\hat{j} + (x+y)\hat{k}$
c)
 $(y+z)\hat{i} - (z+x)\hat{j} - (x+y)\hat{k}$

b)

$$(y+z)\hat{i} - (z+x)\hat{j} + (x+y)\hat{k}$$

d)
 $(y+z)\hat{i} + (z+x)\hat{j} - (x+y)\hat{k}$

(lviii)

 $\nabla \cdot \left(\vec{E} \times \vec{F} \right) =$ a)

 $\vec{F}. \nabla imes \vec{E} - \vec{E}. \nabla imes \vec{F}$

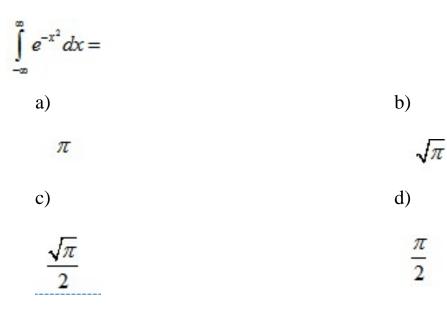
 $\vec{F}.\nabla\!\times\!\vec{F}-\vec{E}.\nabla\!\times\!\vec{F}$

b)

c)

 $\vec{F}. \nabla \times \vec{F} - \vec{E}. \nabla \times \vec{E}$

(lix)



(lx)

The sequence
$$\left\{\frac{1}{n^2}\right\}$$
 is

- a) bounded sequence
- c) divergent sequence

- b) unbounded sequence
- d) none of these



None of these