EXAMINATION PAPER

FACULTY	**:**	**COMPUTER SCIENCE AND MULTIMEDIA**		
COURSE	**:**	**BACHELOR OF INFORMATION TECHNOLOGY (Hons)**		
YEAR/ SEMESTER	**:**	**FIRST YEAR / SEMESTER ONE**		
MODULE TITLE	**:**	**MATH I**		
CODE	**:**	**BIT 116**		
DATE	**:**	**24 - APRIL, 2019, WEDNESDAY**		
TIME ALLOWED	**:**	**3 HOURS**		
START	**:**	**1:00 PM**	**FINISH**	**: 4:00 PM**

Instruction to candidates

1. This question paper has THREE (3) Sections.
2. Answer **ALL** questions in Section A, MCQ.
3. Answer **5** questions in Section B, MSAQ.
4. Answer **2** questions in Section C, MEQ.
5. No scripts or answer sheets are to be taken out of the Examination Hall.
6. For Section A, answer in the OMR form provided.

Do not open this question paper until instructed

SECTION A

Multiple Choice Questions **(30*1=30)**

1. **Any two numbers x and y, written in form(x, y) is called:**
   a. binary relation
   b. domain
   c. range
   d. an ordered pair

2. **Domain of R = {(0, 2), (2, 4), (3, 4), (4, 5)} is:**
   a. {0, 2, 4, 5}
   b. {0, 2, 3, 4}
   c. {2, 4, 5}
   d. {3, 4, 5}

3. **Set consisting of all second elements of each ordered pair in relation is called:**
   a. domain of relation
   b. range of relation
   c. subset
   d. complement of a set

4. **Considering $0° < x < 180°$, angle of sin x = 0.2385 is:**
   a. 21° , 170.32°
   b. 18.02° , 165.02°
   c. 14° , 150°
   d. 13.80° , 166.20°

5. **The equation of the tangent to the curve $y = 4 + \sin^2 x$ at x =0 is:**
   a. y = 2
   b. y = 2
   c. y = 3
   d. y = 4

6. **The function f(x) = tanx – x:**
   a. always increasing
   b. always decreasing
   c. not always decreasing
   d. sometimes increasing and sometimes decreasing

7. **If $f(x) = 3x^2 - x + 2$, find the value of $[f(-1)]^2$.**
   a. 0
   b. 5
   c. 9
   d. 25

8. **The integral value of $\int \frac{dx}{2x+3}$ is:**
   a. $\frac{1}{2}\ln|2x+3|+c$
   b. $\ln(2x+3)+c$
   c. $2\ln(2x+3)$
   d. 0

9. **Growth process which is characterized by constant decrease in percentage of values is referred as:**
   a. exponential infinite process
   b. exponential decay process
   c. exponential growth process
   d. exponential finite process

10. **Range of y = sin(x) is:**
    a. [-1 1]
    b. [-1 0]
    c. [-2 2]
    d. None of the Above

11. **What is the value of $\lim_{x\to 1} \frac{x^2-x-2}{x^2-2x}$?**
    a. -2
    b. -1
    c. 2
    d. Limit doesn't exist

12. **What are the vertical asymptotes for the equation $y = x^2 - 1$?**
    a. X = 2 and x = -2
    b. X =1 and x = -1
    c. Y = -1 and y = 1
    d. None of the above

13. Consider the following infinite series

1/1 + 1/3 + 1/5 + 1/7 + …

Determine, if possible, whether the infinite series converges

a. This series is convergent
b. This series is divergent
c. The convergence tests covered in the infinite series module cannot determine whether this series converges
d. None of the above

14. $\lim_{x\to 1} \sin^{-1} x$ is equal to:

a. $\frac{\pi}{2}$
b. $-\frac{\pi}{2}$
c. 0
d. 1

15. If $f(x) = x\sec x$, then $f(0) =$

a. -1
b. 0
c. 1
d. $\sqrt{(2)}$

16. Range of y = sin(x) is:

a. [-1 1]
b. [-1 0]
c. [-2 2]
d. None of the Above

17. The sequence $x_n=(-1)^n$ is:

a. Converges to 1
b. Converges to -1
c. Neither converges nor diverges
d. None of the above

18. The largest possible domain of $\sqrt{x+1}$ is :

a. (0,1)
b. [0,1)
c. [-1,∞)
d. [1,∞)

19. The integral value of $\int_{-2}^{3} x^2 dx$ is:

a. 16
b. 12
c. 3
d. 16.25

20. The integral value of $\int a dx$ is:

a. ax+c
b. a
c. x
d. 0

21. The solution of dy=($x^5+x^2-\frac{2}{x}$) dx is:

a. y =$\frac{x^6}{6}+\frac{x^3}{3}$ - 2ln(x) + c
b. y=2
c. y =$2x^2+2$
d. y=0

22. The value of $lim_{x\to 1} \frac{2x-3}{x+5}$ is:

a. -1/6
b. 2
c. 3
d. $\frac{1}{0}$

23. The second derivative of y=sin(x) is:

a. sin(x)
b. cos(x)
c. tan(x)
d. -sin(x)

24. The function y=-2x is:

a. Always increasing
b. Always decreasing
c. Neither increasing nor decreasing
d. None of the above

25. The equation of the tangent line to the parabola $y=x^2$ at the point p(1,1) is:

a. y=2x-1
b. y=2x
c. y=2x+1
d. y=x+1

26. The area bounded by the x-axis and the curve $y=4x^3$ and the ordinates at x=2 and x=4 is:

a. 230
b. 240 sq.units
c. 240
d. 0

27. Differentiate the function $y = 6x + 10$, and calculate the value of the slope when x is equal to 1

a. $y' = 6$ and slope = 6
b. $y' = 6$ and slope = 16
c. $y' = 6x$ and slope = 6
d. $y' = 10$ and slope = 10

28. Domain of R = {(0, 2), (2, 4), (3, 4), (4, 5)} is:

a. {0, 2, 4, 5}
b. {0, 2, 3, 4}
c. {2, 4, 5}
d. {3, 4, 5}

29. The equation of the tangent to the curve $y = 4 + \sin^2 x$ at x =0 is:

a. y = 2
b. y = 2
c. y = 3
d. y = 4

30. Any two numbers x and y, written in form(x, y) is called:

a. binary relation
b. domain
c. range
d. an ordered pair

SECTION B
Short Answer Questions
Attempt any five (5) questions out of eight (8) questions (5*6=30)

1. Define the following terms with suitable examples.
   a. Exponential and logarithmic function
   b. Asymptotes

2. Find the volume of the solid obtained by rotating about the y-axis the region between $y = x$ and $y = x^2$.

3. Solve the initial value problem u(t=0) = 0 for the first order ordinary differential equation $\frac{du}{dt} = k(a-u)(b-u)$, where $k > 0, a > 0, b > 0$.

4. Prove that if a function f is continuous on [a, b], then

$$\int_a^b f(x)dx = F(b) - F(a)$$

where F is any antiderivative off, that is, a function such that $F' = f$.

5. Prove that the p-series converges if p >1 and diverges if p ≤ 1.

6. State and prove mean value theorem.[DERIVATIVES]

7. Find the length of the arc of the semi-cubical parabola $y^2 = x^3$ between the points (1, 1) and (4, 8).

8. Find the domain and range of $f(x) = x^2 - 4x + 4$**.** **.**

SECTION C
Long Answer Questions
Attempt any two (2) questions out of (3) three questions (2*20=40)

1. Suppose that a ball is dropped from the upper observation deck of the CN tower, 450 m above the ground.

a. What is the velocity of the ball after 5 seconds? (10)

b. How fast is the ball travelling when it hits the ground? (10)

2.

A. Evaluate indefinite integral for the area of the surface generated by revolving the curve $y = -\frac{1}{2}x^2 + 8, \quad 0 \leq x \leq 4$ about the y – axis. (10)

B. Find the length of the graph of $f(x) = \frac{x^3}{12} + \frac{1}{x}, \quad 1 \leq x \leq 4$. (10)

3. **A.** Find the derivative from first principle of $\sqrt{x+3}$ (10)

B. Solve: (10)

$$\int \left(\frac{e^x - e^{-x}}{e^x + e^{-x}}\right) dx$$

******BEST OF LUCK******