

*II<sup>nd</sup>* SEM. BSc. MATHEMATICS EXAMINATION  
MM2B02 : INFORMATICS AND MATHEMATICAL SOFTWARES  
Duration:3 Hrs 30 weightage

*Answer all 12 questions  $(12 \times \frac{1}{4}) = 3$  weightage*

1. Which of the following is a not an input device? (a) Mouse (b) Scanner (c) LCD Screen (d) Microphone
2. 

```
from numpy import *  
a=array([[0,1],[0,-1]])  
print a*a
```

What is the output?  
(a)  $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$  (b)  $\begin{bmatrix} 0 & -1 \\ 0 & -1 \end{bmatrix}$  (c)  $\begin{bmatrix} 0 & 2 \\ 0 & -2 \end{bmatrix}$  (d)  $\begin{bmatrix} 0,1 \\ 0,-1 \end{bmatrix}$
3. 

```
from pylab import *  
a=arange(0.0,1.0,0.25)  
print a
```

Then output is (a) [0. 0.25 1.0] (b) [0. 0.25 0.5 0.75 1.0] (c) [0. 0.25 0.5 0.75] (d) 4
4. To get italics format for the text **Mathematics** we use  
(a)  $\text{\it{Mathematics}}$  (b)  $\text{\textit{Mathematics}}$   
(c)  $\text{\textit{Mathematics}}$  (d)  $\text{\it{Mathematics}}$  1 weightage
5. Give an example of multi-user, multi-tasking operating system?
6. 

```
from pylab import *  
a=poly1d([1,0,3,4])  
print a[2]
```

What is the output?
7. 

```
from pylab import *  
k = 6  
x= linspace(0, pi,100)  
y = k*x  
polar(x,y)  
show()
```

What is the output of the program?
8. 
$$z_1 = \frac{\alpha^3 + \beta^3}{(x-y)^2}$$
what is the output of above latex statement? 1 weightage
9. 

```
guest@college:~ls  
area.py volume.py  
guest@college:~rm volume.py  
guest@college:~ls
```

What is the output of the last command?
10. 

```
from numpy import *  
a=array([-1,2,4])  
b=array([3,2,-1])  
print .....
```

complete the above print statement to get cross product and dot product of above two vectors as [-10 11 -8] -3 ?

11. Malabar area is getting a monsoon of 30% from june, 35% from july, 25% from august and rest from remaining months. Use python program to draw a piechart for this.

12. What is the latex command used to get the output  $\int_{-1}^5 x^3 dx$  **1 weightage**  
**Short answer type questions (Answer all 9 questions (9 × 1 = 9 weightage))**

13. 

```
>>>s="Differential "  
>>>t="Equation "  
>>>2*(s+t)  
What is the output?
```

14. Use linear space to make an array from 50 to 0 with a step size of 2 and an array b from from 0 to 25 with a step size of 1. find the sum of the two arrays?

15. Write a python program to draw a circle of radius 5 using parametric plot?

16.
  - calculus
  - algebra
  - geometry

Write the latex command to get above items as output?

17. 

```
y=10  
while y<15:  
.    print y,  
.    y+=1  
What is the output of the above program ?
```

18. Write a python program to evaluate a quadratic polynomial  $ax^2 + bx + c$  where **a**, **b** and **c** are, real coefficients which are inputs for the program.

19. Write a python program to draw the curve  $y = x^3$  from  $x = -1$  to  $x = 1$  with the axes labelled?

20.

$$\sum_{i=1}^k \alpha_i u_i + \sum_{j=1}^m \beta_j v_j = - \sum_{r=1}^n \gamma_r w_r$$

Write the latex command to get above mathematics equation as output?

21. How will you write a python program to write this string in reverse order using for loop?

**9 × 1 = 9 weightage**

**Short essay questions (Answer any 5 questions from 7(5 × 2 = 10 weightage))**

22. Write a python program to display numbers from 1 to 10 in 1<sup>st</sup> column, 2<sup>nd</sup> column and its cube in 3<sup>rd</sup> column. Each column should be right justified and each column must given a width of 3, 4 and 5 spaces respectively.

23. Write python program to solve using matrix inversion

$$\begin{aligned}5x_1 + 2x_2 - 3x_3 &= 4 \\ -2x_1 + x_2 - x_3 &= -2 \\ 5x_2 + x_3 &= 6\end{aligned}$$

24. Make a 3d-plot  $z = x^2 + y^2$  using `imshow()`, from  $-3$  to  $3$  for both  $x$  and  $y$ .

25. Write latex coding for the following document

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots + \{-1\}^{n-1} \frac{x^{2n-1}}{(2n-1)!} + \dots \quad (1)$$

26. Use Matplotlib module to write a Python program to plot astroid  $x = a \cos^3 t$ ,  $y = a \sin^3 t$  with different values for the parameter  $a=1, 2, 3, 4, 5$ .

27. Write a Python program to calculate cosine function using series expansion and plot it.

28. Write latex code which involve all major step involving sum and product of A and B.

$$A = \begin{bmatrix} -1 & 3 & 2 \\ 0 & 1 & 7 \\ 3 & -3 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 5 & 1 & 0 \\ 2 & 1 & 1 \\ 4 & 6 & -1 \end{bmatrix}$$

$5 \times 2 = 10$  weightage

**Essay questions (Answer any 2 questions from 3(2 × 4 = 8 weightage)**

29. Write a python program to calculate GCD of two numbers. Modify this to a function program. Using this function program write a program to find GCD of  $n$  numbers.

30. Write a python program to find the value of  $\sqrt{2}$  numerically using bisection method.

31. Write latex codes to generate the question paper displayed below?

**COLLEGE OF MATHEMATICS.**  
**SECOND SEMESTER B. Sc. DEGREE EXAMINATION, JUNE 2011**  
**Calculus**

**Time:2 Hrs**

**20 weightage**

(a) Using Macclaurin's series expand  $\log(1 + \sin x)$ .

(b) Find the sum to infinity the series

$$\frac{15}{16} + \frac{15.21}{16.24} + \dots$$

(c) If  $x$  is small prove that

$$\sqrt{x^2 + 4} - \sqrt{x^2 + 1} = 1 - \frac{x^2}{4} + \frac{7x^4}{64} \text{ nearly.}$$

(d) Prove that  $\frac{2}{3!} + \frac{4}{5!} + \frac{6}{7!} + \dots = e^{-1}$

(e) Show that  $\frac{1^2 2^2}{1!} + \frac{2^2 3^2}{2!} + \frac{3^2 4^2}{3!} + \dots = 27e$ .

$2 \times 4 = 8$  weightage

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