

FACULTY OF ENGINEERING

B.E. I – Year (Backlog) Examination, December 2017

Subject: Mathematics – I

Time: 3 Hours

Max.Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

- 1 State P-series test 2
- 2 Test the series $\sum_{n=1}^{\infty} \frac{2n^2 + 1}{n^2 + 4}$ for convergence. 3
- 3 Discuss the applicability of Rolle's Theorem for $f(x) = |x|$ in $[-2, 2]$. 2
- 4 Find the curvature of the curve $y^2 = x^3$ at $(1, 1)$. 3
- 5 Determine $\lim_{(x,y) \rightarrow (1,2)} \frac{xy}{x^2 + y^2}$. 2
- 6 If $x = r \cos \theta$, $y = r \sin \theta$, find $\frac{\partial(x,y)}{\partial(r, \theta)}$. 3
- 7 Find the gradient of $f(x, y, z) = \log(x^2 + y^2 + z^2)$ at $(1, 1, 1)$. 2
- 8 State Stoke's theorem. 3
- 9 Show that the vectors $(1, 2), (2, 3), (3, 4)$ are linearly dependent. 2
- 10 Find the symmetric matrix of the quadratic form 3
 $Q = x^2 + 2y^2 + 3z^2 + 2xy + 4yz + 6zx$

PART – B (5x10 = 50 Marks)

- 11 a) Examine the convergence or divergence of the series $\sum_{n=1}^{\infty} \left(\sqrt{n^3 + 1} - \sqrt{n^3} \right)$. 5
- b) Test the series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{n}{n^2 + 1}$ for the absolute convergence or conditional convergence. 5
- 12 a) State and prove Lagrange's mean value theorem. 5
- b) Find all asymptotes of the curve $y = \frac{x - 4}{x^2 + 4x + 3}$. 5

13 a) If $f(x,y) = \begin{cases} \frac{y(x^2 - y^2)}{x^2 + y^2}, & (x,y) \neq (0,0) \\ 0 & , (x,y) = (0,0) \end{cases}$, find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ at $(0,0)$, if they exist. 5

b) Expand $f(x,y) = e^x \sin y$ in powers of x and y upto third degree terms. 5

14 a) Find the directional derivatives of $f(x, y, z) = x^2yz + 4xz^2$ at $(1, -2, -1)$ in the direction of the vector $2\hat{i} - \hat{j} - 2\hat{k}$. 5

b) Apply Green's theorem to evaluate $\oint_C e^{-x} \sin y \, dx + e^{-x} \cos y \, dy$, where C is the rectangle whose vertices are $(0,0)$, $(f,0)$, $(f, \frac{f}{2})$, $(0, \frac{f}{2})$. 5

15 a) Show that the equations $2x - 2y + z = 1$, $x + 2y + 2z = 2$, $2x + y - 2z = 7$ are consistent and solve them. 5

b) Verify Cayley – Hamilton theorem for $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$. 5

16 a) Find the envelope of the family of curves $x \tan p + y \sec p = 5$, where p is a parameter. 5

b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} \, dx \, dy$ by changing into polar coordinates. 5

17 a) If \vec{a} is a constant vector and $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, prove that $\nabla \cdot (\vec{a} \times \vec{r}) = 0$. 5

b) Find the eigen values and corresponding eigen vectors of $A = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}$. 5

FACULTY OF ENGINEERING**B.E./B.Tech. (Bride Course) I - Semester (Backlog) Examination, December 2017****Subject : Programming in C****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Write an algorithm to find maximum of three numbers. (3)
- 2 Explain the fixed point number representation. (2)
- 3 What is recursive function to find the GCD of two numbers? (2)
- 4 List the operations performed on pointer variables. (3)
- 5 Discuss about enumeration data type. (2)
- 6 What does fopen() return for successful and unsuccessful opening of a File? (3)
- 7 What is the need of this pointer in a function? Give example. (3)
- 8 List the different ways of passing arguments to function in C++. (2)
- 9 What is the order of calling constructor and destructor in inheritance? Give example. (2)
- 10 What is virtual function?

PART – B (50 Marks)

- 11 (a) Draw and explain the block diagram of a computer. (6)
(b) Write a program to find the reverse of a given number. (4)
- 12 (a) Write a program to find the matrix addition-using pointer to array and function. (5)
(b) Explain the different storage classes with example. (5)
- 13 (a) Write a program to count the number of lines and words in a text file. (5)
(b) Write a program to read the 'n' employee information and display the information about the employee in the increasing order of salary, employee structure should have following fields – employee-id, name, salary. (5)
- 14 (a) Define a class to represent a bank account (5)
Include the following data members and member functions
Data member : Depositor name, A/C no, Type of A/C, Balance amount.
Member function: Initial Balance, Deposit, Withdraw, Display name & balance of account holder who is having highest balance.
(b) Write a program to overload ++ operator to add two complex numbers. (5)
- 15 (a) What is an exception? Explain with example. (5)
(b) What are the different types of stream classes used in C++? Discuss each of them in detail. (5)
- 16 (a) Discuss the static data member of a class. (5)
(b) Write a template class to search for elements in the array elements of integer or floats. (5)
- 17 Write short notes on the following:
(a) Union (3)
(b) C-Preprocessor (3)
(c) Loaders and linkers (4)