FACULTY OF ENGINEERING

B.E. I-Year (Backlog) Examination, November / December 2018

Subject : Mathematics-I

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Determine the nature of the series $\sum\limits_{n=1}^{\infty} \dfrac{1}{\sqrt{n}}$.   2

2. Determine the nature of the series   3

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1} \cdot n}{n^3 + 8}$$

3. Find the envelope of the family of curves $y = 3px - p^3$ where p is a parameter.   2

4. Discuss the applicability of Lagrange mean value theorem for the function $f(x) = x^2 - 9x + 18$ on [3,6].   3

5. Evaluate $\lim\limits_{(x,y)\to(0,0)} \dfrac{x-y}{x+y}$, if it exists.   2

6. If $w = \sqrt{x^2 + y^2 + z^2}$, $x = u\cos v$, $y = u\sin v$, $z = uv$ then evaluate $u\dfrac{\partial w}{\partial u} - v\dfrac{\partial w}{\partial v}$.   3

7. Find a scalar function $f(x,y,z)$ such that $\vec{v} = \nabla f = 12xi - 15y^2 j + k$.   2

8. If $\vec{a} = a_1 i + a_2 j + a_3 k$ is a constant vector and $\vec{r} = xi + yj + zk$. Then evaluate $\text{div}\left(\vec{a} \times \vec{r}\right)$.   3

9. Express $\alpha = (5, 6, 4)$ as a linear combination of the vectors $(1,0,0)$, $(1,2,3)$, $(0,3,5)$.   2

10. Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ -1 & 1 & 1 & -1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$.   3

PART – B (50 Marks)

11 a) Test for convergence $\displaystyle\sum_{n=1}^{\infty} \frac{n^{n^2}}{(n+1)^{n^2}}$ 5

  b) Examine the convergence of   5

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$$

12 a) Find the circle of curvature of the curve $y = x^3 - 6x^2 + 3x + 1$ at the point P(1, -1).   5

  b) Find the asymptotes of the curve
$$x^2(x^2 + y^2) = a^2(y^2 - x^2).$$ 5

13 a) If $f(x,y) = \begin{cases} \dfrac{xy(5x^2 - 4y^2)}{x^2 + y^2}, & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0) \end{cases}$ 5

   Then show that $f_{xy}(0, 0) \neq f_{yx}(0, 0)$.

  b) Find the extreme value of $x+2y$ on the circle $x^2+y^2=1$.   5

14 Verify Stoke's theorem for $\vec{F} = (x^2 - y^2)i + 2xyj$ around the rectangular boundary $x = 0$, $x = a$, $y = 0$ and $y = b$.   10

15 a) Test for consistency and solve, if consistent, the system of equations.   5

$$x + y + z = 3$$
$$3x - 9y + 2z = -4$$
$$5x - 3y + 4z = 6$$

  b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 2 & 0 \\ 1 & 2 & 3 \end{bmatrix}$.   5

16 a) Find the nature, index and signature of the quadratic form   5
$$4x_1^2 + 2x_2^2 + 13x_3^2 - 4x_1x_2 - 8x_2x_3 - 4x_1x_3.$$

  b) Examine for maximum and minimum values of the function   5
$$f(x, y) = x^2 - 3xy + y^2 + 2x.$$

17 a) State and prove Cauchy's mean value theorem.   5

  b) Find the directional derivative of $f(x, y, z) = 2x^2+y^2+z^2$ at (1, 2, 3) in the direction of the line $\dfrac{x}{3} = \dfrac{y}{4} = \dfrac{z}{5}$.   5

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FACULTY OF ENGINEERING & TECHNOLOGY

BE/B. Tech (Bridge Course) I-Semester (Backlog) Examination,

November / December 2018

Subject : Programming in C

Time: 3 Hours   **Max. Marks: 75**

Note: Answer all questions from Part-A, & any five Questions from Part-B.

PART-A (25 Marks)

1. Discuss about the advantages of computers in modern life. (2)
2. Discuss the advantages of flowchart over algorithms. (3)
3. Write the rules for declaring a variable. (2)
4. Write a program in C to demonstrate printf() and scanf(). (3)
5. Write a program in C to find the length of a string without using string handling function. (3)
6. Write the syntax for function prototype. (2)
7. Differentiate between jump and goto statements. (2)
8. Discuss about pointer arithmetic. (3)
9. Differentiate between call by value and call by reference. (3)
10. Define self-referential structure. (2)

PART-B (50 Marks)

11. (i) Write an algorithm for finding a roots of a quadratic equation (5)

    (ii) Draw a flowchart for finding number of days in a month using switch. (5)

12. (i) Write a program in C to find the maximum number from the list using arrays. (5)

    (ii) Discuss the compilation and Execution process of any C program. (5)

13. (i) Write a program in C to display the Fibonacci sequence upto n terms. (5)

    (ii) Write a program in C to find quotient and remainder for any given number. (5)

14. (i) Write a program in C for finding factorial of a number using recursion. (5)

    (ii) Write a program in C to find transpose of a matrix using functions. (5)

15. (i) Explain the mechanism of passing functions to other functions with a program. (7)

    (ii) Write the syntax for void pointer. (3)

16. (i) Discuss typedf of with a program. (5)

    (ii) Discuss union with a program (5)

17. Write a program in C to demonstrate the concept of files in detail. (10)

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