Tribhuvan University

Faculty of Humanities & Social Sciences

OFFICE OF THE DEAN

2018

Bachelor in Computer Applications	**Full Marks: 60**
Course Title: Mathematics II	**Pass Marks: 24**
Code No: CAMT 154	**Time: 3 hours**
Semester: II	

Centre: **Symbol No:**

Candidates are required to answer the questions in their own words as far as possible.

Group A

Attempt all the questions. **[10×1 = 10]**

Circle (O) the correct answer.

37. For all rational values of n, $\lim_{x\to a} = \dfrac{x^n - a^n}{x-a}$ is equal to

    c. na^{n-1} b) $\dfrac{a^{n+1}}{n+1}$ c) na^{n+1} d) $n.a^{n+2}$

38. If $\lim_{x\to x_0} - f(x) \neq \lim_{x\to x_0} + f(x)$ then f(x) is said to be

    a) Removable discontinuity b) An ordinary discontinuity
    c) Infinite discontinuity d) Finite discontinuity

39. Derivative of $\tan^{-1}x$ is equal to

    c) $\dfrac{1}{\sqrt{-x^2}}$ b) $\dfrac{-1}{1+x^2}$ c) $\dfrac{1}{1+x^2}$ d) $\dfrac{-1}{x\sqrt{1^2-1}}$

40. The value of $\lim_{n\to 0} \dfrac{e^x - 1}{x}$ is equal to,

    d) e^x b) 1 c) 0 d) -1

41. The differential equation: $\left(\dfrac{d^2y}{dx^2}\right)^2 + 5\left(\dfrac{dy}{dx}\right)^2 + 2y = 0$ is known as

    d) Second degree second order b) Second degree first order
    c) First degree second order d) First order second degree

42. One important condition to satisfy Rolle's Theorem by a function f(x) in [a, b] is

    d) f(a) > f(b) b) f(a) < f(b) c) f(a) = f(b) d) $f(a) = f(b) \neq 0$

43. Formula for the composite trapezoidal rule is

    d) $\dfrac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + y_3 + \ldots\ldots\ldots\ldots + y_{n-1})]$

    e) $\dfrac{h}{2}[(y_0 + y_n) + 4(y_1 + y_2 + \ldots\ldots\ldots\ldots. + y_{n-1})]$

    f) $\dfrac{h}{3}[(y_0 + y_n) + 3(y_1 + y_2 + \ldots\ldots\ldots\ldots.. + y_{n-1})]$

g) $\frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_3 + y_5 + \ldots\ldots\ldots\ldots\ldots + y_{n-1})]$

44. While applying Simpson's $\frac{3}{8}$ rule the number of sub-interval should be

g) Odd b) 8 c) Even d) Multiple of 3

45. In Gauss Elimination method the given system of simultaneous equation is transformed into

d) Lower tri-angular equation b) Unit matrix

c) transpose matrix d) upper triangular matrix

46. In Newton-Raphson method, if x_n is an approximate solution of f(x) = 0 and $f'(x_n) \neq 0$ the next approximation is given by

j) $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_{n)}}$ b) $\frac{1}{2}\left(x_0 \frac{a}{x_n}\right)$

c) $x_n = x_{n+1} - \frac{f(x_n)}{f'(x_n)}$ d) $x_{n+1} = x_{n-1}\left(x_n + \frac{a}{x_n}\right)$

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Group B

Attempt any SIX questions. **[6×5 = 30]**

47. If a function f(x) is defined as:

$$f(x) = \begin{cases} 3x^2 + 2 & \text{if } x < 1 \\ 2x + 3 & \text{if } x > 1 \\ 4 & \text{if } x = 1 \end{cases}$$

Discuss the continuity of function at x = 1.

48. Find the derivative of sin3x by using definition.

13. Using L-Hospital's rule evaluate:

$$\lim_{x \to \infty} \frac{2x^2 + 3x}{1 + 5x^2}$$

33. If demand function and cost function are given by
P(Q) = 1-3Q and
C(Q) = $Q^2 - 2Q$ respectively, Where Q is the quality (number) of the product then find output of the factor for the maximum profit.

34. Evaluate: a) $\int \frac{dx}{1 - \sin x}$ b) $\int_0^1 (x^2 + 5) dx$

35. Solve: $\frac{dy}{dx} = \frac{xy + y}{xy + x}$

36. Examine the consistency of the system of equation and solve if possible.

$$x_1 + x_2 - x_3 = 1$$
$$2x_1 + 3x_2 + 3x_3 = 3$$
$$x_1 - 3x_2 + 3x_3 = 2$$

Group-C

Attempt any two questions **[2x10=20]**

37. Define Homogeneous equation and solve the following system of equations using Inverse Matrix Method.

$$-2x + 2y + z = -4$$
$$-8x + 7y - 4x = -47$$
$$9x - 8y + 5z = 55$$

38. State Rolle's Theorem and interpret it geometrically. Verify Rolle's theorem for $f(x) = x^2 - 4$ in $-3 \le x \le 3$

20. Using Composite Trapezoidal Rule, compute $\int_0^2 (2x^2 - 1)dx$ with four intervals. Find the absolute error of approximation from its actual value.

Tribhuvan University
Faculty of Humanities & Social
Sciences OFFICE OF THE
DEAN 2019

Bachelor of Arts in Computer Application **Full Marks: 60**
Course Title: C Programming **Pass Marks: 24**
Code No: **Time: 3 hours**

Candidates are required to answer the questions in their own words as far as possible.

Group B

2. Write expansions for log(1+x) and e^x and use the expansion e^x to prove $\lim_{x\to 0}\frac{e^x-1}{x}=1$.
3. Find derivative of $\sqrt{2x-3}$ using definition.
4. Show that the rectangle of largest possible area for a given perimeter 'P' is a square.
5. Evaluate the integral, $\int(3\sin x-4)^2\cos x dx$
6. Solve the differential equation $\frac{dy}{dx}=\frac{x^2+y^2}{2x^2}$.
7. Evaluate the limit, $\lim_{x\to\theta}\frac{x\cos\theta-\theta\cos x}{x-\theta}$.
8. Using Newton-Raphson's method to find the square root of 153 correct to three places of decimals.

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. Using simplex method find the optimal solution of the following linear programming problem

maximize, $z = 2x_1 + 12x_2 + 8x_3$

subject to $2x_1 - 2x_2 + x_3 \le 100$

$x_1 - 2x_2 + 5x_3 \le 80$

$10x_1 + 5x_2 + 4x_3 \le 80$, $x_1, x_2, x_3 \ge 0$

10. a) State Mean value theorem and interpret it geometrically.

b) Find the intervals in which the function $f(x) = x^3 - 3x^2 + 5$ concave upwards and concave downward.

11. a) Find the area bounded by the parabola $y^2 = 4x$ and y axis between the points y = 0 to y = 2.

Tribhuvan University

Faculty of Humanities & Social Sciences

OFFICE OF THE DEAN

2020

Bachelor in Computer Applications
Course Title: Mathematics II
Code No: CAMT154
Semester: II

Full Marks: 60
Pass Marks: 24
Time: 3 hours

Candidates are required to answer the questions in their own words as far as possible.

Group B

Attempt any SIX questions. **[6×5 = 30]**

2. Evaluate the limit $\lim\limits_{x\to 0} \dfrac{\sin ax + bx}{ax + \sin bx}$

3. Find derivative of the function $f(x) = \frac{1}{\sqrt{x}}$ by using first principle.

4. Show that the rectangle of largest possible area for a given perimeter is a square.

5. Evaluate the integral $\int e^{ax} \cos bx \, dx$.

6. Find the area bounded by the curve $y^2 = 4x$ and the line $y = x$.

7. Use the trapezoidal rule with n = 5 to approximate the integral $\int_1^2 \frac{1}{x} dx$.

8. Solve the linear differential equation:
$$(1 + x^2)\frac{dy}{dx} + 2xy = 4\,x^2$$

Group C

Attempt any TWO questions. **[2×10 = 20]**

9. State Rolle's theorem and Lagrange's mean value theorem with their geometrical interpretation. Verify Rolle's theorem for the function $f(x) = sinx, \quad x \in [0, \pi]$. Also find a point in the curve represented by given function where the tangent is parallel to the x-axis.

10. Define true error and percentage error. Write three causes which suggest to stop the process bisection while solving a equation. Solve the following system of equations using Gauss elimination partial pivoting method.

$4x_1 + 2x_2 - 3x_3 = 4$

$x_1 - x_2 + x_3 = 0$

$2x_1 + 4x_2 + x_3 = 7$

11. Define Newton-Raphson method, write it's formula and use it to the solution of the equation $x^3 + x - 1 = 0$ in the interval [0, 1] accurate to within 10^{-4}.