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, $\lim_{x\to a} = \frac{x^n - a^n}{x - a}$ is equal to

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

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

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

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

e) f(a) > f(b) b) f(a) < f(b) c) f(a) = f(b) d) f(a) = f(b) ≠ 0

43. Formula for the composite trapezoidal rule is

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

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

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

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

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

k) $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_{n)}}$ 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:

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

35. 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.

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

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

38. 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]**

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

$-2x + 2y + z = -4$

$-8x + 7y - 4x = -47$

$9x - 8y + 5z = 55$

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

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.