(7 pages) **Reg. No. :** .....

Code No. : 5850 **Sub. Code : PMAE 32**

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2020.

Third Semester

Mathematics – Core

Elective — CALCULUS OF VARIATION AND INTEGRAL EQUATIONS

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A point satisfying the continuously differentiable function f is called _____.

(a) differentiable (b) stationary

(c) integral (d) saturated

2. *N* linear relations among n differentials can be obtained by _____.

(a) continuously differentiable

(b) integration

(c) differentiation

(d) stationary

3. Any quantity which takes on a specific numerical value corresponding to each function is said to be _____.

(a) differentiable

(b) continuously differentiable

(c) stationary point

(d) functional

4. A first order approximation to change the function along a particular curve, while the variation a functional is a first order approximation to change from

(a) point to point (b) set to set

(c) curve to curve (d) line to line

5. Which is an equation in which a function to be determined appears under an integral sign?

(a) Greens function

(b) Integral Equation

(c) Differential Equation

(d) Voltra Integral Equation

6. In voltra equation, when $\alpha = 0$, the unknown functions appears only under the integral sign, and the equation is called integral equation of _____.

(a) second kind (b) third kind

(c) fourth kind (d) first kind

7. The approximate solution of Fedrolm equation can be satisfactorily approximated by the polynomial in x by

(a) Symmetry

(b) Kernal

(c) Asymmetry

(d) Influence function

8. The function $G(x,\xi)$, which represents the effect at x due to the unit concentrated cause at ξ, is often known as

(a) voltra function

(b) influence function

(c) integral function

(d) differential function

9. IN homogenious Fedrholm equation the kernel is _____.

(a) symmetric

(b) asymmetric

(c) integral function

(d) differential function

10. Any function $f(x)$ can be generated from a _____.

(a) regular function

(b) discontinuous function

(c) continuous function

(d) normal function

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Of all parallelepipeds which have sides parallel to the co-ordinate planes, and which are inscribed in the elipsoid. Determine the dimension of that one which has the largest possible volume.

Or

(b) Establish the equivalence of the continuously differentiable equations.

12. (a) If $I(y) = \int_0^1 \sqrt{1 + (y')^2}\, dy$, calculate $I(x)$.

Or

(b) If $I(y) = \int_0^1 \sqrt{1 + (y')^2}\, dy$, Calculate $I(\cosh x)$.

13. (a) Write about Lagrange's Multipliers.

Or

(b) What are the kind of integral equations? Explain.

14. (a) Obtain the most general solution of the equation $y(x) = \lambda \int_0^{2\pi} \sin(x+\xi)\, y\, \xi\, d\xi + F(x)$, when $F(x) = x$ and $F(x) = 1$.

Or

(b) Determine the most general form of the prescribed function $F(x)$ for which the integral equation $F(x) = \sin(x+\xi)d\xi$ of the first kind posses the solution.

15. (a) Find the iterative method for solving equations of 2nd kind.

Or

(b) Solve the integral equation $y(x) = \sin x + \lambda \int_0^{2\pi} \cos(x+\xi) y(\xi) d\xi$.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Explain maxima and minima of the continuously differentiable function.

Or

(b) Explain the simplest case of the differentiable function.

17. (a) Explain the variational notations.

Or

(b) What is meant by variable end points? Explain briefly.

18. (a) Explain Green's function and give an example.

Or

(b) Find the relation between differential and integral equations.

19. (a) Explain influence function.

Or

(b) Explain briefly about Fredholm equation with separable kernels.

20. (a) Show that, for sufficiently small values of $[\in]$, an approximate solution of the equation $y = \in \int_0^{\alpha} e^{-|x-\xi|} y(\xi) d\xi + 1$ is afforde by the expression $y(x) \approx 1 + \in \left[2 - e^{-x} - e^{-(\alpha - x)}\right]$.

Or

(b) Explain Hilbert Schmidt Theory.

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