TB165150E

Reg. No.: ....

Name : ....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2018
(2016 Admission Regular & 2015 Admission Supplementary)
SEMESTER V- CORE COURSE (COMPUTER APPLICATIONS)
CAM5B06TB - DIFFERENTIAL EQUATIONS AND FUZZY MATHEMATICS

Time: Three Hours **Maximum Marks: 80**

PART A

I. Answer all questions. Each question carries 1 mark.

1. Write the general form of Bernoulli Equation.
2. Define homogeneous differential equations
3. Define a UC function
4. Define linear differential equation.
5. Define Fuzzy set.
6. Define level set

(6 x 1 = 6)

PART B

II. Anwer any seven of the following. Each question carries 2 marks.

7. Solve $\frac{dy}{dx} + y = xy^3$
8. Find the orthogonal trajectories of the curve. $xy = c$
9. $Solve\ \frac{d^2y}{dx^2} + y = 0$
10. Solve $y'' + 3y' - 10y = e^{2x}$
11. $Solve\ \frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 0$
12. Eliminate arbitrary constants from the equation $ax^2+by^2+z^2=1$
13. The direction cosines of the tangent at the point (x,y,z) to the conic $ax^2 + by^2 + cz^2 = 1$, $x + y + z = 1$ are proportional to $(by - cz, cz - ax, ax - by)$.
14. If u is a function of x,y and z which satisfies the partial differential equation $(y - z)\frac{\partial u}{\partial x} + (z - x)\frac{\partial u}{\partial y} + (x - y)\frac{\partial u}{\partial z} = 0$. Show that u contains x, y and z only in combinations $x + y + z$ and $x^2 + y^2 + z^2$
15. Prove that $\propto_{\bar{A}} = \overline{(1-\propto)_A^+}$ for every $\propto, \beta \in [0,1]$ and A, B ϵ $F(X)$
16. Let A, B ϵ $F(X)$. Then , for all $\propto \in [0,1]$, Prove that $A \subseteq B$ iff $\propto_A \subseteq \propto_B$.

(7 × 2=14)

PART C

III. Answer any five of the following. Each question carries 6 marks.

17. Solve the initial value problem that consists of the differential equation $(x^2 + 1)\frac{dy}{dx} + 4xy = x$, where $y(2) = 1$.
18. Solve $(x + 2y + 3)\,dx + (2x + 4y - 1)\,dy = 0$.

(P.T.O)

19. Find the general solution of the differential equation $x^3 \frac{d^3y}{dx^3} - 4x^2\frac{d^2y}{dx^2} + 8x\frac{dy}{dx} - 8y = \ln x$.

20. State and prove second decomposition theorem

21. Using variation of parameters $\frac{d^2y}{dx^2} + y = \tan x$

22. Prove that the parametric equations of a surface are not always unique.

23. Find the integral curves of the equation $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$

24. State and prove first decomposition theorem.

(5 × 6=30)

PART D

IV. Answer any two of the following. Each question carries 15 marks.

25. Solve $\frac{dy}{dx} + y = xy^3$.

26. Find the solution of the Solve $\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} - 6y = e^x$ using variation of parameters.

27. (a) Find the integral curves of the integral curves of the equation $\frac{adx}{(b-c)yz} = \frac{bdy}{(c-a)zx} = \frac{cdz}{(a-b)xy}$

(b) Eliminate arbitrary function f from the equation $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$.

28. a) Prove that a fuzzy set A on R is convex iff $A[\lambda x_1 + (1-\lambda)x_2] \geq \min[A(x_1), A(x_2)]$ for every $x_1, x_2 \in R$ and $\lambda \in [0, 1]$.

b)Let $A, B \in F(X)$.then the following properties hold for all $\alpha, \beta \in [0,1]$:

(i) ${}^{\alpha+}A \subseteq {}^{\alpha}A$;

(ii) $\alpha \leq \beta$ implies ${}^{\alpha}A \supseteq {}^{\beta}A$ and ${}^{\alpha+}A \supseteq {}^{\beta+}A$

(iii) ${}^{\alpha}(A \cap B) = {}^{\alpha}A \cap {}^{\alpha}B$ and ${}^{\alpha}(A \cup B) = {}^{\alpha}A \cup {}^{\alpha}B$

(iv) ${}^{\alpha+}(A \cap B) = {}^{\alpha+}A \cap {}^{\beta+}A$ and ${}^{\alpha+}(A \cup B) = {}^{\alpha+}A \cup {}^{\beta+}A$

(2 x 15 = 30)