Reg. No.....

IFTH SEMESTER B.Sc. DEGREE (U.G.—CCSS) EXAMINATION
NOVEMBER 2014

(SDE)

Mathematics

MM 5B 08—DIFFERENTIAL EQUATIONS

Part A

	DD	MM	YEAR	
Date cif Examination :				FN/AN

Time : 15 Minutes **Total No. of Questions : 20**

INSTRUCTIONS TO THE CANDIDATE

1. This Question Paper carries Multiple Choice Questions from 1 to 20.
2. Immediately after the commencement of the examination, the candidate should check that the question paper supplied to him/her contains all the 20 questions in serial order.
3. Write the Name, Register number and the date of examination in the space provided.
4. Each question is provided with choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and enter it in the main answer-book.
5. **Candidate should handover this Question paper to the invigilator after 15 minutes and before receiving the question paper for Part B Examination.**

MM 5B 08—DIFFERENTIAL EQUATIONS

Part A

Multiple Choice Questions

1. **The order of the differential equation** $(y'')^2 + y = e^x$ **is**

   (A) 0. **(B) 1.**

   (C) 2. **(D) None of these.**

2. **Which of the following is a separable differential equation ?**

   (A) $\frac{dy}{dx} \quad \frac{x2}{1-y^2}$ **(B)** $\frac{dy}{dx} \quad \frac{x+y}{x-y}$

   (C) $\frac{dy}{dx}$ **+ (sin x) y =** e^x **(D)** $\left(\frac{dy}{dx}\right)^2$ **+ (sin x) y = 0.**

3. **An integrating factor of the differential equation** $ty' + 2y = 4t^2$ **is ?**

   (A) t^3**.** **(B)** t^4**.**

   (C) t^2**.** **(D) None of these.**

4. **The general solution of the differential equation** $2x(3x + y - ye^x)\,dx + (x^2 + 3y^2 + e^x)\,dy = 0$ **is :**

   (A) $x^2 y + ye^{-x2} + 2x^3 + y^3 = C.$ **(B)** $x^2 y^2 yex2 +$ **(2x + y² = C).**

   (C) $xy + ye^{-x2} + y^2 = C.$ **(D)** $xy^2 + y + 2x^3 e^{-x2} + y^3 = C.$

5. **The solution of the differential equation** $y' = y^2$**, y (0) =1 exists in the region :**

   (A) $(0, \infty)$. **(B)** $(-00, 0)$.

   (C) $(-\infty, 1)$. **(D)** $(-00, 00)$.

6. **The general solution of the differential equation** $(D^2 + 2D + 3)\,y = 0$ **is :**

   (A) $y = e^{-x}$ **[**$c_1 \cos 2x + c_2 \sin 2x$**].** **(B)** $y = ex$ **[**$c_i \cos 2x + c_2$ **sin**

   (C) $y = e^x [c_1 \cos 2x + c_2 \sin \sqrt{2}\, x]$ **(D) None of these.**

7. **A particular solution** of the differential equation $y'' + y = \tan x$ is :

   (A) Cos*x* **Log (Sec x + tan x).** **(B)** Cos*x* **Log (Sin x + Cos x).**

   (C) **Log** (sin*x* **+ cos** *x*) **.** **(D)** Log Sin*x*

8. A particular solution of $y'' + 5y' + 6y = e^{2x}$ is :

(A) $\frac{e^{2x}}{20}$ (B) 20

(C) e^{2x} (D) e^{-2x}.

9. The Differential equation $x^2 y'' - xy' - 3y = x^2 \log x$ can be converted into a differential equation with constant coefficients using the transformation :

(A) $x = e$ (B) $z = e^{x}$.

(C) $x = \log z$. (D) $x = z^2$.

10. If $y_1(x)$ and $y_2(x)$ are two independent solutions of the linear differential equation $a_0(x)y'' + a_1(x)y' + a_2 + [x]y = 0$ then

(A) $y_1(x)\, y_2(x)$ is also a solution. (B) $y_1(x) + y_2(x)$ is also a solution.

(C) $y_1(x) / y_2(x)$ is also a solution. (D) $y_1(x) \quad y_2(x)$ is also a solution.

11. Let $y_1(x)$ and $y_2(x)$ be two linearly independent solutions of the differential equation $a_0(x)y'' + a_1(x)y' + a_2[x]y = 0$ then the Wronskian $w(y_1, y_2)$ is :

(A) 1. (B) 0.

(C) 2. (D) - 1.

12. The characteristic equation of the differential equation $[D^2 - 4D + 4]y = 0$ is

(A) $(\lambda - 2)^3 = 0$. (B) $(\lambda + 2)^2 = 0$.

(C) $(\lambda - 2)^2 = 0$. (D) $(\lambda - 1)(\lambda - 2) = 0$.

13. The characteristics roots of the differential equation $(D^2 - 8D + 25)y = 4\cos 2x$ are :

(A) Real (B) Complex.

(C) Real and complex. (D) None of these.

14. Which of the following is a boundary value problem :

(A) $y' + y = 0, y(0) = 1, y'(0) = 0$.

(B) $y'' + 5y = 0, y(0) \quad y'(0) = 3$.

(C) $x^2 y'' + xy' + y = 0, y(0) = 0, y(1) = 2$.

(D) $+ y'' + y = 0, y(0) = y'(0) = y''(0) = 0$.

15. The general form of a first or linear equation is

(A) $\frac{dy}{dx} - Py = Q$ where P and Q are functions of x.

(B) $\frac{d^2y}{dx^2} + Py = Q$ where P is a functions of x.

(C) $\frac{dy}{dx} = Q$ where Q is a function of x.

(D) None of these.

16. The general solution of the differential equation y"+ y = 0 is

(A) $y = a\sin x + b\cos x$.

(B) $y = a \sin x$.

(C) $y = b \cos x$.

(D) $y = \sin x - \cos x$.

17. If $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ is a function of y only, then an integrating factor of the differential equation $M dx + N dy = 0$ is :

(A) $\mu(x) = \exp\left[\int \left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right) dy\right]$

(B) $\mu(x) = \exp\left[\int \frac{1}{M}\left(\frac{\partial N}{\partial x} + \frac{\partial M}{\partial y}\right) dy\right]$

(C) $\mu(x) = \int \frac{1}{M}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$

(D) $\mu(x) = \frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dy$.

18. An integrating factor of the differential equation $\frac{dy}{dx} + P(x) = Q(x)$ is

(A) $e^{\int p dx}$

(B) $e^{-\int p dx}$.

(C) $e^{\int p\, dx}$

(D) $e^{\int (p + Q) dx}$

19. The initial value problem $y' = y^2$ y (0) = 0, $t \geq 0$:

(A) A Unique solution..

(B) Infinitely many solutions.

(C) No solution.

(D) Two solution.

20. The general solution of the differential equation $3(x^2 + y^2)\,dx + x(x^2 + 3y^2 + 6y\,dy = 0$ is :

(A) $x^3 e^{xy} + 3xy^2 e^y = c$.

(B) $x^3 e^y + 3xy^2 ey = c$.

(C) $x^2 e^{xy} + 3x^2 y^2 e^y = c$.

(D) $xe^y + ye^y = c$.