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Examination October 2020

B.Sc. T.Y (Sem-V)

2187_2 Mathematics MAT-504 2) Ordinary Differential Equation -I

Time: One Hour **Max. Marks: 25**

Instructions

Solve any 25 questions from Q.1 to Q.30

1 The value of $\frac{1+i}{1-i}=.....$

(A)i (B)–i (C)i (D)None of these

2 The modulus of a complex number z = x + iy is

(A) x^2+y^2 (B) $\sqrt{x^2+y^2}$ (C) $\sqrt{x^2-y^2}$ (D)None of these

3 If $r=a+ib\neq 0,$ where a, b are real then $(e^{rx})'=.....$

(A) e^{rx} (B) e^{x} (C) $\Re^{rx}$ (D)None of these

4 If r is such that $r^3=1$ and $r\neq 1$ then $r^2+r+1=.....$

(A)1 (B)Zero (C)–1 (D)None of these

5 The power series expansion for $\sin(\theta)=.....$

(A) $1-\frac{\theta^2}{2!}+\frac{\theta^4}{4!}-.....$ (B) $\theta-\frac{\theta^3}{3!}+\frac{\theta^5}{5!}=.....$ (C) $1+\frac{\theta^2}{2!}+\frac{\theta^3}{3!}+.....$ (D)None of these

6 The solution of the differential equation y1 + cos x. y = 0 is

(A) $\emptyset(x)=e^{-sinx}$ (B) $\emptyset(x)=e^{sinx}$ (C) $\emptyset(x)=e^{cosx}$ (D)None of these

7 $\emptyset(x)=\sin 2x$ Is a solution of the differential equation

(A) $y^1+2y=0$ (B) $y^{11}-y^1=0$ (C) $y^{11}+4y=0$ (D)None of these

8 The solution of the differential equation $y^1+y=e^x$ is

(A) $\emptyset(x)=\frac{e^x}{2}+ce^x$ (B) $\emptyset(x)=\frac{e^{-x}}{2}+ce^{-x}$ (C) $\emptyset(x)=\frac{e^x}{2}+ce^x$ (D)None of these

9 The solution of the differential equation $y^1+cosx\,y=sinx\,cosx$ is

(A) $\emptyset(x)=(sinx+1)+ce^{sinx}$ (B) $(sinx-1)+ce^{cosx}$ (C) $\emptyset(x)=(sinx-1)+ce^{sinx}$ (D)None of these

10 If $\emptyset(x)=-ix+1+e^{ix}$ is a solution of y^1 + iy = x, then $\emptyset(\pi)=.....$

(A) $-(\pi)i$ (B) $(\pi)i$ (C)1 (D)None of these

11 If $\emptyset_1$, $\emptyset_2$, are two solutions of L(y) = 0 on an interval I containing a point x0 then $w(\emptyset_1,\emptyset_2)(x)=.....$

(A) $e^{a_1(x-x_0)}w(\emptyset_1,\emptyset_2)(x)$ (B) $e^{-a_1(x-x_0)}w(\emptyset_1,\emptyset_2)(x)$ (C) $e^{-a_1(x-x_0)}w(\emptyset_1,\emptyset_2)(x_0)$ (D)None of these

12 The solutions $\emptyset_1(x)=\cos x$, $\emptyset_2(x)=\sin x$ are

(A)Linearly independent (B)Linearly dependent (C)Same (D)None of these

13 All solutions of the equation $y^{11}+y^1-2y=0$ are riven by

(A) $\emptyset(x)=c_1e^{-2x}+c_2e^{x}$ (B) $c_1e^{2x}+c_2e^{-x}$ (C) $\emptyset(x)=c_1e^{-2x}+c_2e^{-x}$ (D)None of these

14 The linearly independent solutions of the equation $y^{111}-3y^1+2y=0$ are

(A) e^{-x},xe^{x},e^{2x} (B) e^{x},xe^{x},e^{-2x} (C) e^{x},xe^{-x},e^{-2x} (D)None of these

15 If $\emptyset_1$, $\emptyset_2=e^{2x}$, $\emptyset_3=e^{-2x}$ then $w(\emptyset_1,\emptyset_2,\emptyset_3)(x)$ is

(A)0 (B)1 (C)16 (D)None of these

16 The roots of $Z^2=2$ are

(A) $\sqrt{2}$ (B)sqrt -2 (C) $\pm\sqrt{2}$ (D)None of these

17 If $F(x)=(5x^2-1)+3ix$ then F'(x) = ...

(A)10x (B)10x + 3i (C)x + 3i (D)None of these

18 A complex number r is called the root of P if

(A) $P(r)\neq 0$ (B)P(r) = 1 (C)P(r) = 0 (D)None of these

19 If $\emptyset(x)=e^{rx}$, where r is a complex constant and x is a real then $\emptyset'(x)-r\emptyset(x)=.....$

(A)0 (B)1 (C)r (D)None of these

20 Consider the system of equations

$iz_1+z_2=1+i$

$2z_1+(2-i)z_2=1$

Then the determinant of the coefficients $\Delta=.....$

(A)2i – 1 (B)2i + 1 (C)2 (D)None of these

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21 All solutions of $y^1 = ky$ are of the form

(A) $\emptyset(x) = e^{kx}$ (B) $\emptyset(x) = ce^{kx}$ (C) $\emptyset(x) = ce^{-kx}$ (D)None of these

22 The solution of the differential equation $y^1 - 2y = 1$ is

(A) $\emptyset(x) = \frac{1}{2} - ce^{2x}$ (B) $\emptyset(x) = \frac{1}{2} + ce^{-2x}$ (C) $\emptyset(x) = \frac{-1}{2} + ce^{2x}$ (D)None of these

23 Solutions of the differential equation $3y^1 + y = 2e^{-x}$ is

(A) $\emptyset(x) = e^{-x} + ce^{-x/3}$ (B) $\emptyset(x) = -e^{-x} + ce^{-x/3}$ (C) $\emptyset(x) = e^{x} + ce^{x/3}$ (D)None of these

24 The solution of the differential equation $y^{11} + 4y = 0$ is

(A) $y = e^{2x}$ (B) $y = e^{ix}$ (C) $y = e^{2ix}$ (D)None of these

25 The solution of the differential equation $y^1 = e^{3x} + sinx$ on $-\infty < x < \infty$ is

(A) $\emptyset(x) = e^{3x} - \cos x + c$ (B) $\emptyset(x) = \frac{e^{3x}}{3} + \cos x + c$ (C) $\emptyset(x) = \frac{e^{3x}}{3} - \cos x + c$ (D)None of these

26 The solution of the differential equation $y^{11} - y^1 = 0$ is

(A) $\emptyset(x) = e^{x}$ (B) $\emptyset(x) = \cos x$ (C) $\emptyset(x) = \sin x$ (D)None of these

27 The solution of the initial value problem $y^{11} - 2y^1 - 3y = 0$ is

(A) $\emptyset(x) = c_1 e^{3x} + c_2 e^{-x}$ (B) $\emptyset(x) = c_1 e^{-3x} + c_2 e^{x}$ (C) $\emptyset(x) = c_1 e^{-3x} + c_2 e^{-x}$ (D)None of these

28 All solutions of the equation $y^{11} + 16y = 0$ are given by

(A) $\emptyset(x) = c_1 e^{4x} + c_2 e^{-4x}$ (B) $c_1 e^{4ix} + c_2 e^{-4ix}$ (C) $\emptyset(x) = c_1 e^{4x} + c_2 e^{4x}$ (D)None of these

29 The characteristic polynomial of the differential equation $L(y) = y^{11} + a_1 y^1 + a_2 y = 0$, where a1, a2, are constants is given by

(A) $P(r) = r^2 + a_1 + a_2$ (B) $P(r) = r^2 + a_1 r + a_2$ (C) $P(r) = a_1 r + a_2$ (D)None of these

30 Two linearly independent solutions of the equation $4y^{11} - y = e^{x}$ are

(A) $e^{x/2}$ (B) e^{x} , e^{-x} (C) e^{x} , $e^{x/2}$ (D)None of these