

**D****DF-3015****Second Year B. Sc. (Sem. III) Examination****March / April – 2016****MTH - 302 : Mathematics**

Time : 2 Hours]

[Total Marks : 50

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="Second Year B. Sc. (Sem. III)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="MTH - 302 : Mathematics"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="5"/>	Section No. (1, 2,.....): <input type="text" value="Nil"/>
Student's Signature	

- (2) There are four SECTIONS (A, B, C, D) in this question paper.
- (3) There is only one correct answer for each question.
- (4) Follow usual symbols.

SECTION - A : Q. 1 to 4 Multiple choice questions : (1 mark)
SECTION - B : Q. 5 to 8 Multiple Choise Questions : (2 marks)
SECTION - C : Q. 9 to 14 Multiple choice questions : (3 mark)
SECTION - D : Q. 15 to 18 Multiple Choise Questions : (5 marks)

O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ
O.M.R. Sheet ની પાછળ છાપેલ છે.
Important instructions to fillup O.M.R. Sheet
are given on back side of the provided O.M.R. Sheet.

1 For changing independent variable x to z in

1

$$\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)y = R(x) \text{ the transformation is}$$

(A) $z = \int Q dx$

(B) $z = \frac{1}{a} \int \sqrt{P} dx$

(C) $z = \frac{1}{a} \int \sqrt{Q} dx$

(D) $z = \frac{1}{a} \int Q dx$

2 If $a, b \in R$ then the general solution of the linear differential

1

equation $(D+a)(D+b)y=0$ is

(A) $y = c_1 e^{ax} + c_2 e^{-bx}$

(B) $y = c_1 e^{-ax} + c_2 e^{-bx}$

(C) $y = c_1 e^{-ax} + c_2 e^{-bx}$

(D) $y = c_1 e^{ax} + c_2 e^{bx}$

3 $(x+4)^2 + \frac{d^2y}{dx^2} - 4(x+4)\frac{dy}{dx} + 6y = x$ transformed to l.d.e with constant 1

coefficients takes the form

(A) $(D+2)^2 y = ze^{2z}$

(B) $(D+2)^2 y = e^{2z}$

(C) $(D+2)^2 y = z^2 e^z$

(D) $(D-2)^2 y = ze^{2z}$

4 The known integral y_1 for $x^2 \frac{d^2y}{dx^2} - 2x(1+x)\frac{dy}{dx} + 2(1+x)y = x^3$ is 1

(A) $y_1 = x$

(B) $y_1 = x^3$

(C) $y_1 = x^{-1}$

(D) $y_1 = x^2$

- 5 Solution of $\frac{d^2y}{dx^2} + \frac{2}{x} \frac{dy}{dx} - 9y = 0$ by removal of 1st ordered derivative gives general solution as 2
- (A) $y = \frac{c_1 e^x + c_2 e^{-x}}{x}$
- (B) $y = \frac{c_1 e^{4x} + c_2 e^{-4x}}{x}$
- (C) $y = \frac{c_1 e^{3x} + c_2 e^{-3x}}{x}$
- (D) $y = \frac{c_1 e^{3x} + c_2 e^{-3x}}{x^2}$
- 6 The general solution of $\frac{d^2y}{dx^2} - 4y = 2 \sin\left(\frac{x}{2}\right)$ is 2
- (A) $y = c_1 e^{-2x} + c_2 e^{2x} - \frac{8 \sin x}{17}$
- (B) $y = c_1 e^{-2x} + c_2 e^{2x} - \frac{8 \sin\left(\frac{x}{2}\right)}{17}$
- (C) $y = c_1 e^{-2x} + c_2 e^{2x} - \frac{8 \cos x}{17}$
- (D) $y = c_1 e^{-2x} + c_2 e^{2x} - \frac{8 \cos x}{17}$
- 7 The complimentary function of $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$ is 2
- (A) $y = (c_1 + c_2 \log x)x$
- (B) $y = (c_1 + c_2 \log 3x)x$
- (C) $y = (c_1 + c_2 \log 3x)x^2$
- (D) $y = (c_1 + c_2 \log 2x)x$
- 8 The known integral of $\frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} + xy = x$ is 2
- (A) $y_1 = 2x$
- (B) $y_1 = -x$
- (C) $y_1 = \sqrt{x}$
- (D) $y_1 = x$

- 9 The general solution of $\frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} + xy = x$ in terms of known integral is 3

(A) $y = 1 + xc_1 \int \frac{e^{x^3/3}}{x} dx + c_2x$

(B) $y = 1 + c_1 \int \frac{e^{x^3/3}}{x^2} dx + c_2x$

(C) $y = 1 + xc_1 \int \frac{e^{x^3/3}}{x^2} dx + c_2x$

(D) $y = 1 + xc_1 \int \frac{e^{x^3/3}}{\sin x} dx + c_2x$

- 10 The general solution of $\frac{d^2y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = 0$ by removal of 1st ordered derivative is 3

(A) $y = c_1 \tan x \cos(\sqrt{6}.x + c_2)$

(B) $y = c_1 \sec x \cos(\sqrt{6}.x + c_2)$

(C) $y = c_1 \sec x \operatorname{cosec}(\sqrt{6}.x + c_2)$

(D) $y = c_1 \operatorname{cosec} x \sin(\sqrt{6}.x + c_2)$

- 11 The general solution of $\frac{d^4y}{dx^4} - 2 \frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} = x$ is 3

(A) $y = c_1 + c_2x + (c_3 + c_4x)e^x + \frac{x^3}{6} - x^2$

(B) $y = c_1 + c_2x + (c_3 + c_4x)e^x + \frac{x^3}{6} + x^2$

(C) $y = c_1 + c_2x + (c_3 + c_4x)e^x + \frac{x^3}{6} + \log x$

(D) $y = c_1 + c_2x + (c_3 + c_4x)e^x - \frac{x^3}{6} + x^2$

12 The general solution of $(D^2 - 1)y = xe^{2x}$ is 3

(A) $c_1e^x + c_2e^{-x} + \frac{e^{-2x}(5x-4)}{25}$

(B) $c_1e^x + c_2e^{-x} + \frac{e^{2x}(x+4)}{25}$

(C) $c_1e^x + c_2e^{-x} + \frac{e^{2x}(5x-4)}{25}$

(D) $c_1e^x + c_2e^{-x} + \frac{e^{2x}(4x-5)}{25}$

13 The general solution of $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x^2$ is 3

(A) $c_1 \log(\cos x) + c_2 \log(\sin x) + \frac{x^2}{2}$

(B) $c_1 \cos(\log x) + c_2 \sin(\log x) + e^x$

(C) $c_1 \cos(\log x) + c_2 \sin(\log x) + \log x$

(D) $c_1 \cos(\log x) + c_2 \sin(\log x) + \frac{x^2}{2}$

14 The general solution of $x^2 \frac{d^2y}{dx^2} - 5x \frac{dy}{dx} + 9y = x^5$ is 3

(A) $y = (c_1 + c_2 \log x)x^3 + \frac{x^5}{4}$

(B) $y = (c_1 + c_2 \log x)x^2 + \frac{x^5}{4}$

(C) $y = (c_1 + c_2 \log x)x^3 + \frac{x^4}{5}$

(D) $y = (c_1 + c_2 \log x)x^3 + \frac{x^4}{4}$

- 15 The general solution of $\frac{d^2y}{dx^2} + \frac{2}{x} \frac{dy}{dx} - n^2 y = 0$ by removal of first ordered derivative is 5

(A) $y = \frac{c_1 e^x + c_2 e^{-x}}{x}$

(B) $y = \frac{c_1 e^{nx} - c_2 e^{-nx}}{x}$

(C) $y = \frac{c_1 e^{nx} + c_2 e^{-nx}}{x}$

(D) $y = \frac{c_1 e^{nx} + c_2 e^{-nx}}{x^2}$

- 16 The general solution of $\frac{d^2y}{dx^2} - y = x^2 \cos x$ is 5

(A) $y = c_1 e^x + c_2 e^{-x} - \frac{(x^2 - 1) \cos x}{2} + x \sin x$

(B) $y = c_1 \cos 2x + c_2 \sin 2x + \frac{\sin 3x - e^x}{5} + \frac{2x^2 - 1}{8}$

(C) $y = c_1 e^x + c_2 e^{-x} - \frac{(x^2 - 1) \cos x}{2} + x^2 \cos x$

(D) $y = c_1 e^x + c_2 e^{-x} - \frac{(x^2 - 1) \cos x}{2} + x \cos x$

- 17 The general solution of $(3x+2)^2 \frac{d^2y}{dx^2} - 4(3x+2) \frac{dy}{dx} + 6y = x$ is 5

(A) $y = c_1(3x-2)^2 + c_2(3x-2) + \frac{\{(3x+2)^2 \log(3x+2) + 1\}}{108}$

(B) $y = c_1(3x+2)^2 + c_2(3x+2) + \frac{\{(3x+2)^2 \log(3x+2) + 1\}}{108}$

(C) $y = c_1(3x+2)^2 + c_2(3x+2) + \frac{\{(3x+2)^2 + 1\}}{108}$

(D) $y = c_1(3x+2)^2 + c_2(3x+2) + \frac{\{(3x+2)^2 \log(3x+2) + 1\}}{108}$

- 18 The general solution of $x^2 \frac{d^2y}{dx^2} - 2x(1+x) \frac{dy}{dx} + 2(1+x)y = 0$ in 5
terms of known integral is

(A) $y = c_1x + c_2xe^x$

(B) $y = c_1x + c_2xe^{2x}$

(C) $y = c_1x + c_2x^2e^x$

(D) $y = c_1x + c_2e^{2x}$