B

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.

Name of the Examination :

☛ **Second Year B. Sc. (Sem. III)**

Name of the Subject :

☛ **MTH - 302 : Mathematics**

☛Subject Code No. : **3 0 1 5** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

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 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) $y_1=x^{-1}$

(B) $y_1=x^2$

(C) $y_1=x$

(D) $y_1=x^3$

2 For changing independent variable x to z in **1**

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

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

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

(C) $z=\int Q dx$

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

3 If $a, b \in R$ then the general solution of the linear differential equation $(D+a)(D+b)y = 0$ is **1**

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

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

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

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

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

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

5 The known integral of $\frac{d^2y}{dx^2} - x^2\frac{dy}{dx} + xy = x$ is **2**

(A) $y_1 = \sqrt{x}$

(B) $y_1 = x$

(C) $y_1 = 2x$

(D) $y_1 = -x$

6 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) $y = \frac{c_1e^{3x} + c_2e^{-3x}}{x}$

(B) $y = \frac{c_1e^{3x} + c_2e^{-3x}}{x^2}$

(C) $y = \frac{c_1e^{x} + c_2e^{-x}}{x}$

(D) $y = \frac{c_1e^{4x} + c_2e^{-4x}}{x}$

7 The general solution of $\frac{d^2y}{dx^2} - 4y = 2\sin\left(\frac{x}{2}\right)$ is **2**

(A) $y = c_1e^{-2x} + c_2e^{2x} - \frac{8\cos x}{17}$

(B) $y = c_1e^{-2x} + c_2e^{2x} - \frac{8\cos x}{17}$

(C) $y = c_1e^{-2x} + c_2e^{2x} - \frac{8\sin x}{17}$

(D) $y = c_1e^{-2x} + c_2e^{2x} - \frac{8\sin\left(\frac{x}{2}\right)}{17}$

8 The complimentary function of $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 2\log x$ is **2**

(A) $y = \left(c_1 + c_2\ \log 3x\right)x^2$

(B) $y = \left(c_1 + c_2\ \log 2x\right)x$

(C) $y = \left(c_1 + c_2\ \log x\right)x$

(D) $y = \left(c_1 + c_2\ \log 3x\right)x$

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

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

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

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

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

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

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

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

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

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

11 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) $y=c_1\sec x\cos ec\left(\sqrt{6}.x+c_2\right)$

(B) $y=c_1\cos ec\,x\sin\left(\sqrt{6}.x+c_2\right)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(A) $y=\frac{c_1e^{nx}+c_2e^{-nx}}{x}$

(B) $y=\frac{c_1e^{nx}+c_2e^{-nx}}{x^2}$

(C) $y=\frac{c_1e^{x}+c_2e^{-x}}{x}$

(D) $y=\frac{c_1e^{nx}-c_2e^{-nx}}{x}$

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

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

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

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

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

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

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

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

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

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