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# RAN-0840

## Second Year B.Sc. (Sem. III) Examination

## March / April - 2019

## MTH - 303 : Mathematics

**Time: 2 Hours ]** **[ Total Marks: 50**

**સૂચના : / Instructions**

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
**Fill up strictly the details of ☛ signs on your answer book**

Name of the Examination:

☛ **Second Year B.Sc. (Sem. III)**

Name of the Subject :

☛ **Mathematics**

Subject Code No.: **0 8 4 0**

Seat No.:

Student's Signature

1) There are FOUR sections (A, B, C, D) in this questions paper.
2) Tere is only ONE correct answer for each question.
3) Follow the usual symbols.

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

**1.** A partial differential equation by eliminating $a$ *and* $b$ from $z = axe^y + \frac{1}{2}a^2e^{2y} + b$ is **1**

(A) $q = px + p^2$ (B) $q = p + p^2y$

(C) $p = qx + q^2$ (D) $q = py + p^2$

**2.** Solution of partial differential equation $pq = xy$ is **1**

(A) $z = \frac{1}{2}[a^2x^2 + y^2 + 2ab]$ (B) $z = \frac{1}{2a}[a^2x^2 + ay^2 + b]$

(C) $z = \frac{1}{2a}[a^2x^2 + y^2 + ab]$ (C) $z = \frac{1}{2a}[a^2x^2 + y^2 + 2ab]$

**3.** General solution $X^2 \frac{d^2y}{dx^2} + y = 0$ is **1**

(A) $y = 2\sqrt{x}\cos\left(\frac{3}{2}\log x + \alpha\right)$ (B) $y = \sqrt{x}\cos\left(\frac{\sqrt{3}}{2}\right)\log x + \alpha$

(C) $y = 2\sqrt{x}\cos\left(\frac{\sqrt{3}}{2}\log x + \alpha\right)$ (D) $y = 2x\cos\left(\frac{\sqrt{3}}{2}\log x + \alpha\right)$

**4.** A partial differential equation by eliminating $F$ from $z = F(x^2 + y^2)$ is **1**

(A) $yp = xq = 0$ (B) $yp - xq = 0$

(C) $xp - yq = 0$ (D) $xp = yq = 0$

**5.** Particular Integral of a differential equatio **2**

$x^2 \frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = x^2 \log x$ is

(A) $\frac{x^3}{6}(\log x)^3$ (B) $\frac{x^2}{6}(\log x)^2$

(C) $-\frac{x^2}{6}(\log x)^3$ (D) $\frac{x^2}{6}(\log x)^3$

**6.** A partial differential equation by eliminating $f$ and $g$ from $f(x + ay) + g(x - ay)$ is **2**

(A) $a^2 r - t = 0$ (B) $a^2 r + t = 0$

(C) $a^2 s - t = 0$ (D) $a^2 s + t = 0$

**7.** Complete Solution of partial differential equation $q = 3p^2$ is **2**

(A) $z = ax + a^2y + a^3$ (B) $z = a^2x + ay + b$

(C) $z = ax + 3a^2y + b$ (D) $z = ax + a^2y + b$

**8.** General Solution of partial differential equation $yzp + zxq = xy$ is **2**

(A) $f(x^2 + y^2, y^2 - z^2) = 0$ (B) $f(x^2 - y^2, y^2 - z^2) = 0$

(C) $f(x^2 - y^2, y^2 + z^2) = 0$ (D) $f(x^2 + y^2, y^2 + z^2) = 0$

**9.** Complete Solution of partial differential equation $p + 3q = 5z + \tan(y - 3x)$ is **2**

(A) $f(y - x, e^{-5x}(5z + \tan(y - x)) = 0$

(B) $f(y + 3x, e^{-5x}(5z + \tan(y - 3x)) = 0$

(C) $f(y - 3x, e^{-5x}(5z + \tan(y + 3x)) = 0$

(D) $f(y - 3x, e^{-5x}(5z + \tan(y - 3x)) = 0$

**10.** Complete Solution of partial differential equation $z^2(p^2 + q^2 + 1) = c^2$ is **2**

(A) $(ax + y + b)^2 = (a^2 - 1)(c^2 - z^2)$

(B) $(ax + y + b)^2 = (a^2 + 1)(c^2 + z^2)$

(C) $(x + ay + b)^3 = (a^2 + 1)(c^2 - z^2)$

(D) $(x + ay + b)^2 = (a^2 + 1)(c^2 - z^2)$

**11.** Complete Solution of partial differential equation $p = qy+q^2$ is **3**

(A) $z = \frac{1}{4}[-y^2 + y\sqrt{y^2 + 4a} + 4a\,log\,(y + \sqrt{y^2 + 4a})] + ax + b$

(B) $z = \frac{1}{4}[y^2 + y\sqrt{y^2 + 4a} + 4a log\,(y + \sqrt{y^2 + 4a})] + ax + b$

(C) $z = \frac{1}{4}[-y^2 + y\sqrt{y^2 - 4a} + 4a log\,(y + \sqrt{y^2 + 4a})] + ax + b$

(D) $z = \frac{1}{4}[-y^2 + y\sqrt{y^2 + 4a} + a\,log\,(y + \sqrt{y^2 + 4a})] + ax + b$

**12.** The general solution of $x^3\frac{d^3y}{dx^3} - 4x^2\frac{d^{2y}}{dx^2} + 5x\frac{dy}{dx} - 2y = 0$ is **3**

(A) $y = Ax^{-2} + x^{\frac{5}{2}}\left[Bx^{\frac{\sqrt{21}}{2}} + Cx^{\frac{-\sqrt{21}}{2}}\right]$

(B) $y = Ax^2 + x^{\frac{5}{2}}\left[Bx^{\frac{\sqrt{21}}{2}} + Cx^{\frac{-\sqrt{21}}{2}}\right]$

(C) $y = Ax^2 + x^{\frac{-5}{2}}\left[Bx^{\frac{\sqrt{21}}{2}} + Cx^{\frac{-\sqrt{21}}{2}}\right]$

(D) $y = Ax^{-2} + x^{\frac{-5}{2}}\left[Bx^{\frac{\sqrt{21}}{2}} + Cx^{\frac{-\sqrt{21}}{2}}\right]$

**13.** The general solution of $[D^2 + 4xD + 4x^2]\,y = 0$ where $0\,where\,D \equiv \frac{d}{dx}$ by removal of first order derivative is **3**

(A) $y = e^{x^2}[c_1 e^{\sqrt{2x}} + c_2 e^{-\sqrt{2}x}]$

(B) $y = e^x\,[c_1 e^{\sqrt{2x}} + c_2 e^{-\sqrt{2}x}]$

(C) $y = e^{-x^2}[c_1 e^{\sqrt{2x}} + c_2 e^{-\sqrt{2}x}]$

(D) $y = e^x[c_1 e^{\sqrt{2x}} + c_2 e^{-\sqrt{2}x}]$

**14.** The general solution of $[D^2 + cotx\ D + 4cosec^2x]y = 0$, $= D \equiv \frac{d}{dx}$ by transforming the independent variable x to z is **3**

(A) $c_1 \cos\left[\log\tan\left(\frac{x}{2}\right)\right] + c_2 \sin\left[\log\tan\left(\frac{x}{2}\right)\right]$

(B) $c_1 \cos\left[2\log\tan(x)\right] + c_2 \sin\left[2\log\tan(x)\right]$

(C) $c_1 \cos\left[2\log\tan\left(\frac{x}{2}\right)\right] + c_2 \sin\left[2\log\tan\left(\frac{x}{2}\right)\right]$

(D) $c_1 \cos\left[\frac{1}{2}\log\tan\left(\frac{x}{2}\right)\right] + c_2 \sin\left[\frac{1}{2}\log\tan\left(\frac{x}{2}\right)\right]$

**15.** The complete Integral of partial differential equation $p^2z^4 + q^2z^2 = 1$ is **5**

(A) $(z^2 - a^2)^3 = 9(x+ay+b)^2$ (B) $(z^2+a^2)^{-3} = 9(x+ay+b)^2$

(C) $(z^2 - a^2)^3 = 9(x+ay+b)^{-2}$ (D) $(z^2+a^2)^3 = 9(x+ay+b)^2$

**16.** The general solution of $(1+2x)^2\frac{d^2y}{dx^2} - 6(1+2x)\frac{dy}{dx} + 16y = 8(1+2x)^2$ is **5**

(A) $y = (1+2x)^2[A + B\,log(1+2x) + \{log(1+2x))\}^2)]$

(B) $y = (1+2x)^{-2}[A + log(1+2x) + B\,log(1+2x)^2]$

(C) $y = (1+2x)^2[A + Blog(1+2x) + Clog(1+2x)^2]$

(D) $y = (1+2x)[A + Blog(1+2x) + log(1+2x)^2]$

**17.** The general solution of $4x^2\frac{d^2y}{dx^2} + 4x^5\frac{dy}{dx} + (x^8 + 6x^4 + 4)y = 0)$ by removal of first order derivative is **5**

(A) $y = e^{\frac{1}{8}x^4}x^{\frac{1}{2}}\left[A\cos\left(\frac{\sqrt{3}}{2}\log x\right) + B\sin\left(\frac{\sqrt{3}}{2}\log x\right)\right]$

(B) $y = e^{-\frac{1}{8}x^4}x^{\frac{1}{2}}\left[A\cos\left(\frac{\sqrt{3}}{2}logx\right) + B\sin\left(\frac{\sqrt{3}}{2}logx\right)\right]$

(C) $y = e^{-\frac{1}{8}x^4}x^{\frac{1}{2}}\left[A\cos\left(\frac{\sqrt{3}}{2}x\right) - B\sin\left(\frac{\sqrt{3}}{2}x\right)\right]$

(D) $y = e^{-\frac{1}{8}x^4}x^{\frac{1}{2}}\left[A\cos\left(\frac{\sqrt{3}}{2}x\right) + B\sin\left(\frac{\sqrt{3}}{2}x\right)\right]$

**18.** The general solution of $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$ is **5**

(A) $Ax^{-1} + Bx^{-2} + x^2e^x$ (B) $Ax^{-1} + Bx^2 + x^{-2}e^x$

(C) $Ax^{-1} + Bx^{-2} + x^{-2}e^x$ (D) $Ax^1 + Bx^{-2} + x^{-2}e^x$