P. S. SCIENCE & H. D. PATEL ARTS COLLEGE, KADI

Internal Examination

B. Sc. Semester - V **[Marks - 40**

8-10-2015] **Mathematics - 503** **[1-30 to 3-00**

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1. [A] Prove that the Sol^{-n} of $(D - m_1)(D - m_2)....(D - m_n)y = 0$ is $y = c_1 e^{m_1 x} + c_2 e^{m_2 x} + ... + c_n e^{m_n x}$

OR

[A] Prove that $\frac{1(e^{ax} V)}{f(D)} = e^{ax} \frac{1}{f(D+a)} V$

where a is constanut, V is a function of x.

[B] **Any two.**

(i) Solve : $(D^2 + 1)y = \sec^2 x$

(ii) Solve : $(D^2 - 1)y = e^{-x} \sin(e^{-x}) + \cos(e^{-x})$

(iii) Solve : $(D^2 - 2D + 1)y = x e^x \sin x$

2. [A] If Lineur $diff^{-}n$ equation

$P_0 \overset{(n)}{y} + P_1 \overset{(n-1)}{y} + P_2 \overset{(n-2)}{y} + ... + P_n y = \phi(x)$,

where $P_0, P_1, ... P_n$ are function of x, is exact then

$P_n + (-1) \overset{(1)}{P}_{n-1} + (-1)^2 \overset{(2)}{P}_{n-2} + ... + (-1)^n \overset{(n)}{P}_0 = 0$

[B] **Any two**

(i) Solve : $y^{(2)} + 2\tan x\, y^{(1)} + 3y = \tan^2 x \sec x$

(ii) Solve : $x^2 y y_2 + (xy_1 - y)^2 - 3y^2 = 0$

(iii) Solve : $y^{(2)} + \{y^{(1)}\}^2 = 1$

[P.T.O.

3. [A] If $y = vz$ is the general sol^{-n} of eq^{-n} $y^{(2)} + Py^{(1)} + Qy = R$ then normal form of above eq^{-n} is

$$V^{(2)} + Q_1 V = R_1 \text{ Where } R_1 = \frac{R}{Z}, \quad Z = e^{-\frac{1}{2}\int P dx}$$

$$\text{and } Q_1 = Q - \frac{1}{2}P^{(1)} - \frac{P^2}{4}$$

[B] **Any two.**

(i) Solve : $xy^{(2)} - (x + 1)y^{(1)} + y = x^2$

(ii) Solve : $x\frac{d}{dx}\left(x\frac{dy}{dx} - y\right) - 2xy^{(1)} + 2y + x^2y = 0$

(iii) Solve : $xy^{(2)} - (2x - 1)y^{(1)} + (x - 1)y = 0$

(iv) Solve : $x^2y^{(2)} - 2x(x + 1)y^{(1)} + 2(x + 1) = x^3$

Where the integrals in the C.F are $y = x$, $y = xe^{2x}$.
