

GOVERNMENT DEGREE COLLEGE GANDERBAL
DEPARTMENT OF MATHEMATICS

Assignment for BA / BSc 2nd Semester Regular/Backlog

DIFFERENTIAL EQUATIONS
Marks: 90

Course Code: BMMCR 16201

Attempt any four questions and each question carries equal marks.

Q1. Define exact differential equation. State and prove the necessary and sufficient condition for exactness. And hence verify

$$(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$$

for exactness.

Q2. Solve

(a) $(D - 2)^2y = 8(e^{2x} + \sin 2x + x^2)$
(b) $(x^3D^3 + 2x^2D^2 + 2)y = 10(x + x^{-1})$

Q3. Solve the differential equations

(a) (i) $y = 2px - p^2$ (ii) $y - y^2 p^3 = 2px$
(b) (i) $yy_2 + y_1^2 = y_1$ (ii) $xy_3 + y_2 = 12x$

Where,

$$p = y_1 = \frac{dy}{dx} \qquad y_2 = \frac{d^2y}{dx^2} \qquad y_3 = \frac{d^3y}{dx^3}$$

Q4. (a) Define Legendre polynomial and hence prove that

$$p_n(x) = (2n - 1)p_{n-1}(x) - (n - 1)p_{n-2}(x)$$

(b) Define Bessel function and prove that

(i) $\frac{d}{dx}[x^{-n}J_n(x)] = -x^{-n}J_{n+1}(x)$
(ii) $xJ'_n(x) = nJ_n(x) - xJ_{n+1}(x)$

Q5.(a) Define order and degree of partial differential equation and solve

$$(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$$

(b) Solve by using Charpits Method

$$2z + p^2 + qy + 2y^2 = 0$$

Important Instructions:

1. The students will mail the assignment on email id gdcgbl12math@gmail.com.
2. **Last date of assignment submission is 26/06/20.**
3. The assignment must be handwritten.
4. Students must write page no., roll no., registration no. on the top right corner of each page.
5. A4 size ruled paper with not more than 10 pages converted into a single PDF file using. camscanner will be only accepted.
6. Students are advised to preserve hard copy of Assignment.
7. Do not copy answers from other students.
8. Assignments should be scanned properly for clear visibility.

Title page of assignment must contain

- Name of the candidate.....
- Semester.....
- Category:Fresh/Backlog.....
- Batch:.....
- Roll No.....
- Regd no.....
- Subject.....
- Cell no.....
- e-mail address.....
- Date of Submission.....
- Signature of Candidate.....