

BMTC-132

ASSIGNMENT BOOKLET

DIFFERENTIAL EQUATIONS

(Valid from 1st Jan, 2026 to 31st Dec, 2026)

It is compulsory to submit the assignment before filling in the exam form.



**School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068**

(2026)

Dear Student,

Please read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 per cent, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is in this booklet covering all the blocks of the course. The total marks of the three parts are 100, of which 35% are needed to pass it.

Instructions for Formatting Your Assignments

Before attempting the assignment please read the following instructions carefully:

- 1) On top of the first page of your answer sheet, please write the details exactly in the following format:

ROLL NO.:

NAME:

ADDRESS:

.....

.....

COURSE CODE:

COURSE TITLE:

ASSIGNMENT NO.:

STUDY CENTRE: **DATE:**

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

- 2) Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
- 3) Leave 4 cm margin on the left, top and bottom of your answer sheet.
- 4) Your answers should be precise.
- 5) While solving problems, clearly indicate which part of which question is being solved.
- 6) This assignment is valid only upto December, 2026. If you have failed in this assignment or fail to submit it by December, 2026, then you need to get the assignment for the year 2027 and submit it as per the instructions given in the programme guide.
- 7) **You cannot fill the Exam Form for this course** till you have submitted this assignment. So solve it and **submit it to your study centre at the earliest.**

We strongly suggest that you retain a copy of your answer sheets.

We wish you good luck.

ASSIGNMENT

Course Code: BMTC-132
Assignment Code: BMTC-132/TMA/2026
Maximum Marks: 100

1. State whether the following statements are true or false. Justify your answer with the help of a short proof or a counter example: (5×2=10)
 - a) y^2 is an integrating factor of the differential equation:
$$6xy \, dx + (4y + 9x^2)dy = 0.$$
 - b) The solution of the differential equation $\frac{dy}{d} = y$ with $y(0) = 0$ exists, but is not unique.
 - c) $\sin x \frac{d^2y}{dx^2} + \frac{dy}{dx} + y = 0$ in $]0, \pi[$ is a linear homogeneous equation.
 - d) The solution of the differential equation
$$\frac{dy}{dx} = y$$
 with $y(0) = 0$ exists, but is not unique.
 - e) The Pfaffian equation $(2xy^2 + 2xy + 2xz^2 + 1)dx + dy + 2z \, dz = 0$ is integrable.
2.
 - a) Apply the method of variation of parameter to solve the differential equation:
$$y'' + 6y' + 9y = \frac{1}{x^3} e^{-3x}, \quad x > 0. \quad (5)$$
 - b) Suppose that a thermometer having a reading of 75°F inside a house is placed outside where the air temperature is 15°F . Two minutes later it is found that the thermometer reading is 30°F . Find the temperature reading $T(t)$ of the thermometer at any time t . (5)
3.
 - a) Find the integral surface of the p.d.e.:
$$(x - y)p + (y - x - z)q = z$$
through the circle $z = 1, x^2 + y^2 = 1$. (5)
 - b) Solve: $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$. (5)
4.
 - a) Using Charpit's method, find the complete integral of the p.d.e.:
$$2xz - px^2 - 2qxy + pq = 0. \quad (4)$$
 - b) Using the method of undetermined coefficients, solve the differential equation:
$$(D^3 + 2D^2 - D - 2)y = e^x + x^2. \quad (4)$$

- c) Solve the differential equation: $\frac{dy}{dx} = (x + y)^2$. (2)
5. a) A particle falls from rest in a medium in which the resistance is λv^2 per unit mass, v being the velocity of the particle at time t . Prove that the distance fallen in time t is $\frac{1}{\lambda} \ln \cosh (t\sqrt{g\lambda})$, where g is the acceleration due to gravity. (5)
- b) Solve: $(y^2 + yz)dx + (z^2 + zx)dy + (y^2 - xy)dz = 0$. (5)
6. a) Solve: $(D^2 + 5DD' + 5D'^2)z = x \sin (3x - 2y)$. (5)
- b) Solve: $\frac{dx}{y^2 + yz + z^2} = \frac{dy}{z^2 + zx + x^2} = \frac{dz}{x^2 + xy + y^2}$. (5)
7. a) Using the method of variation of parameters, solve the equation

$$\frac{d^2y}{dx^2} + a^2y = \sec ax$$
. (4)
- b) Solve $(p + q)(px + qy) = 1$, using Charpit's method. (4)
- c) Solve: $\frac{dy}{dx} = \frac{1}{x + y + 1}$. (2)
8. a) Solve: $(D^2 - DD' - 2D) z = \sin(3x + 4y) + e^{2x+y}$. (5)
- b) Use the method of variation of parameters to solve the following differential equation:

$$y'' - 2y' + y = \frac{12e^x}{x^3}$$
. (5)
9. a) Solve: $x^2y'' - 2xy' - 4y = x^2 + 2 \ln x$. (5)
- b) Solve the equation $(7y - 3x + 3)dy + (3y - 7x + 7)dx = 0$. (5)
10. a) Using the method of undetermined coefficients, solve the equation

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 4x^2$$
. (5)
- b) Using Charpit's method, solve the equation

$$zp^2 - y^2p + y^2q = 0$$
. (5)