May 2023(Reappear)	
B.Sc.(H)(Mathematics) II SEMESTER	
Differential Equation(BMH -202)	
Time: 3 Hours	Max. Marks:75

Instructions:
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
2. Answer any four questions from Part -B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

PART-A

Que.1(a)Define general and singular solutions of a differential equation.

(b)Write the condition to check the exactness of a differential equation.

(c) Solve $dy/dx - x\tan(y-x) = 1$.

(d)Find the solution of $(D^2-2D-3)y = 3e^{2x}$.

(e)Find the solution of $(4D^3+4D^2+D)y = 0$.

(f)Solve $(y+z)dx + dy + dz = 0$.(check the condition of integrability only).

(g) Write the condition for $Pdx + Qdy +Rdz = 0$ to be exact.

(h)Show that the wronskian of the functions $\sin x$, $\cos x$, $\sin 2x$ is non-zero.

(i)Briefly explain compartmental model.

(j)Write short note on lake pollution model. $(1.5*10 = 15)$

PART-B

Que.2(a)Solve the given Bernoulli's equation: $dy/dx + y\tan x = y^3\sec x$.   (7)

(b)Solve the given differential equation:

$$(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0.$$ (8)

Que.3(a)Solve $(D^3 - D^2 - 6D)y = 1+x^2$.   (7)

(b)Using the method of variation of parameter, find the solution of $(D^2+1)y = x\sin x$.   (8)

Que.4(a)Solve the given simultaneous differential equation :

$(D+4)x+3y = t$, $(D+5)y+2x = e^t$, where $D = d/dt$.   (7)

(b) Solve the total differential equation, $2yzdx+zxdy - xy(1+z)dz = 0$.   (8)

Que.5 Define exponential decay model .Formulate an expression for it .Also find the solution of it.   (15)

Que.6(a)Find the solution of differential equation:

$$(y - x + 1)dy - (y + x + 2)dx = 0.$$ (7)

(b)Solve the given Cauchy's Euler differential equation:

$(x^3D^3+3x^2D^2+xD+8)y = 65\cos(\log x)$, $x > 0$.   (8)

Que.7(a) Using method of auxiliary equation, solve

$(x^2y - y^3- y^2z)dx + (xy^2 - x^2z - x^3)dy+(xy^2 + x^2y)dz = 0$.   (7)

(b) Solve the differential equation: $(D^2+D+1)y = \sin 2x$.   (8)