



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours/Programme 2nd Semester Supplementary Examination, 2021

MTMHGEC02T/MTMGCOR02T-MATHEMATICS (GE2/DSC2)

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Question No. 1 and any five from the rest

1. Answer any **five** questions from the following: 2×5 = 10
- (a) Solve the differential equation $(1 + y^2)dx = xydx$.
- (b) Examine whether the differential equation $(x^2 + y^2 + 4)xdx + (x^2 + y^2 + 9)ydx = 0$ exact or not.
- (c) Solve the differential equation $p^2 + p - 6 = 0$, $p = \frac{dy}{dx}$.
- (d) What is the general solution of the differential equation $y = px - p^2$, $p = \frac{dy}{dx}$?
- (e) Find complementary function of the differential equation $(D^2 - 4D + 4)y = 0$?
- (f) Eliminate the arbitrary constants A and B from the relation $y = A \sin x + B \cos x$ to form a differential equation.
- (g) Find the order and the degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 + y\left(\frac{dy}{dx}\right)^2 - 2x = 0$.
- (h) Form a partial differential equation by elimination of the arbitrary constant from the relation $z = ax + y$.
2. (a) Solve the differential equation: $xdy - ydx = \cos\left(\frac{1}{x}\right)dx$. 4+4
- (b) Find the solution of the differential equation $(x^2 + y^2 + 2x)dx + 2ydy = 0$ when $x = 1$ and $y = 1$.
3. (a) Solve the differential equation $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 6e^{5x}$. 4+4
- (b) Solve the differential equation $(x^2D^2 - xD + 1)y = \log x$.

4. (a) Solve $p^2 + 2px + py + 2xy = 0$, $p = \frac{dy}{dx}$. 4+4

(b) Show that e^x and e^{3x} are solutions of the differential equation $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 6e^{5x}$.

5. (a) Solve the linear simultaneous equations $\frac{dx}{dt} - 7x + y = 0$, $\frac{dy}{dt} - 2x - 5y = 0$. 3+5

(b) Solve the linear simultaneous equations $\frac{dx}{dt} + 5x + y = e^t$, $\frac{dy}{dt} - x + 3y = e^{2t}$.

6. (a) Eliminate a, b from the relation $z = ax^2 + by^2 + ab$. 4+4

(b) Find the complete integral of the following partial equation by Charpit's method: $pxy + pq + qy = yz$.

7. (a) Solve the partial differential equation: $(y-z)\frac{\partial z}{\partial x} + (z-x)\frac{\partial z}{\partial y} = x-y$. 4+4

(b) Form a partial differential equation by eliminating the arbitrary function from the relation $x + y + z = f(x^2 + y^2 + z^2)$.

8. (a) Solve: $\frac{a^4 dx}{(b-c)yz} = \frac{b^3 dy}{(c-a)zx} = \frac{c^2 dz}{(a-b)xy}$. 4+4

(b) Solve: $(x^2 + y^2 + z^2) dx - 2xydy - 2xzdz = 0$.

9. (a) Solve: $(D^2 - 3D + 2)y = \sin 3x$ 4+4

(b) Find the particular integral of $(D^3 + 3D^2)y = 108x^2$.

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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