

(i) Printed Pages : 2

Roll No.

(ii) Questions : 8

Sub. Code :

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Exam. Code :

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B.A./B.Sc. (General) 4th Semester

(2054)

MATHEMATICS

Paper : II (Differential Equations-II)

Time Allowed : Three Hours]

[Maximum Marks : 30

Note :— Attempt **five** questions from in all, by selecting at least **two** from each unit.

UNIT—I

1. (a) Show that $J_n(-x) = (-1)^n J_n(x)$ if n is any integer. 3
(b) Prove that $\cos(x \sin \phi) = J_0(x) + 2 \cos 2\phi J_2(x) + \dots$ 3
2. Solve $y'' + x^2 y = 1 + x + x^2$ in powers of x . 6
3. (a) Express $x^3 - x^2 + 4x - 6$ in terms of Legendre's polynomial. 3
(b) Prove Rodrigue's formula for $P_n(x)$. 3

4. (a) Find the general solution of partial differential equation
 $p + q = \sin x$. 3
- (b) Form partial differential equation by eliminating arbitrary
 function from $z = f(x^2 + 2y^2)$. 3

UNIT—II

5. (a) State and prove linear property of Laplace transformation. 3
- (b) Find $L(t \sin \alpha t)$. 3
6. (a) Find $L^{-1}\left(\log \frac{s+6}{s+5}\right)$. 3
- (b) Using convolution theorem find $L^{-1}\left(\frac{1}{(s+\alpha)(s+\beta)}\right)$. 3
7. (a) Solve the integral equation $y(t) = 1 + \int_0^t y(u) \sin(t-u) du$. 3
- (b) Solve $\frac{d^2 y}{dt^2} + \frac{dy}{dt} = 2$ where $y(0) = 3, y'(0) = 1$. 3
8. (a) Evaluate $\int_0^\infty \sin(x^2) dx$. 3
- (b) Find $L^{-1}\left(\frac{120}{s^6}\right)$. 3

8. (a) Explain how the discharge potential of an ion helps in deciding the deposition of a metal on the electrode from a solution containing a number of different ions. 2
- (b) Explain the terms electrolytic polarization and concentration polarization. 2

(Compulsory Question)

9. (a) What are freezing mixtures ? Give examples.
- (b) What is the cause of positive deviations from Raoult's law ? What are its consequences ?
- (c) What is the effect of temperature on distribution law ?
- (d) State Kohlrausch's law. Why is it called the law of independent migration of ions ?
- (e) What is liquid junction potential ?
- (f) What is EMF of a cell ? Why EMF of the cell drops to zero after some time ? $6 \times 1 = 6$