COURSE CODE – 2030503

PG DEGREE EXAMINATION – JAN 2009

MSC (MATHS)

DIFFERENTIAL EQUATIONS WITH HIGHER ORDERS

(For the Candidates Admitted from Calendar 2007 onwards)

Time:3 hours **Max.Marks:75**

Section – A

Answer all the questions: **15 $\times$ 1 = 15**

1. The function ϕ which is zero for all x is also a solution the……… of L(y) = 0.
2. State sturns comparison theorem.
3. The polynomial in λ of degree n, det (λ E - A) is called the…….
4. Define linear homogeneous systems.
5. Write down the variation of constants formula.
6. Write down the green's formula.
7. Let ϕ_1..........ϕ_n be n solutions of L(y) = 0 on an interval……..
8. Define Bessel equation. to the solution.
9. Write the first two approximations ϕ_0, ϕ_1.
10. Write the properties of limit.
11. Define linear independent.
12. Write down the wronskian formula.
13. The n solutions of L(y) =?.
14. State the existence theorem.
15. Compute one linearly independent solution.

Section-B

Answer any Five Questions: **5 $\times$ 6 = 30**

16. a) State and prove Uniqueness theorem.

(Or)

b)I f ϕ_1, ϕ_2 are two solutions of L(y) = 0 on an interval I containing a point X_0 then $W(\phi_1, \phi_2)(x) = e^{-\alpha(x-x_0)} W(\phi_1, \phi_2)(x_0)$.

17. a) There exist n linearly independent solutions of L(y) = 0 on

(Or)

b) Find two linearly independent solutions of the equation $(3x-1)^2 y^{11} + (9x-3)y^1 - 9y = 0.$

18. a) State and prove Green's formula.

(Or)

b) The characteristic polynomial for A is given by $f(\lambda) = \lambda^n + a_1\lambda^{n-1} + ...\pm a_n.$

19. a) State and prove Picards theorem.

(Or)

b) In π_n has only the trivial solution, Green's function G^+ for $\pi_n{}^+$ is given by $G^+(t,\tau) = \overline{G}(\tau, t)$.

20. a) If $A_{24} \neq 0$, the difference $\sigma_m - S_m$ tends to zero as $m \to \infty$,uniformly on $0 \le t \le \pi$.

(Or)

b) I f necessary and sufficient that $z = \infty$ be a regular insular point of the equation.

Section – C

Answer any Two Questions: **$2 \times 15 = 30$**

21. For any real x_0 ,and constants α, β there exists a solution ϕ of the initial value Problem on $-\infty <$ x $< \infty$.

22. Let $\phi_1 ....\phi_n$ be n solutions of L(y) = 0 on an interval I , and let X_0 be any point in I , then

$$W(\phi_1 ......\phi_n)(x) = \exp\left[-\int_{x_0}^{x} a_1(t)dt\right] W(\phi_1 ......\phi_n)(x_0).$$

23. If ϕ is a fundamental matrix for L (h), then the function ϕ defined by

24. Let γ be nonnegative continuous and of period I,

If $\int_0^1 \gamma(t)dt \leq 4$ show that $x^{11} + \gamma(t)x = 0$ Stable solutions on $(-\infty, \infty)$.

25. Show that $J^1{}_0$ satisfies the Bessel equation of order one $x^2 y^{11} + xy^1 + (x^2 - 1)y = 0.$