LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SECONDSEMESTER – APRIL 2017

16UMT2AL03- MATHEMATICS FOR CHEMISTRY - II

Date: 27-04-2017 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

SECTION – A

ANSWER ALL QUESTIONS: **(10 x 2 = 20)**

1. Define Jacobins.
2. Define Beta and Gamma functions.
3. Solve : $\frac{dy}{dx} + \left(\frac{1-y^2}{1-x^2}\right)^2 = 0.$
4. Solve : $(a^2 - 2xy - y^2)dx - (x+y)^2 dy = 0.$
5. Define Laplace transforms.
6. Find L$(t^2 + 2t + 3)$.
7. Write the formula of Newtons Raphson method.
8. State Newtons backward formula.
9. Define an abelian group.
10. Define normal subgroup.

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5 x 8 = 40)**

11. Evaluate $\int\int xydxdy$ taken over the positive quadrant of the circle $x^2 + y^2 = a^2$.
12. With usual notations prove that i) $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.

    ii)Find $\int_0^1 x^7(1-x)^8\, dx$ **(5+3)**
13. Solve : $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 4y = e^{-x}$.
14. Solve : $p^2 + q^2 = npq$.
15. Evaluate $\int_0^\infty e^{-2t} sin3tdt$.
16. Find L$[te^{-t}sint]$.
17. By using Gauss Elimination method solve $x + y = 2; 2x + 3y = 5$.
18. Show that $\{1,3,7,9\}$ is an abelian group under multiplication modulo 10.

SECTION – C

ANSWER ANY TWO QUESTIONS: **(2 x 20 = 40)**

19. (a) Evaluate $\iiint xyz\, dx\, dy\, dz$ taken through the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$

    (b) With usual notations prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. **(8+12)**

20. (a) Solve: $(D^2 + 4D + 5)y = e^x + x^2 + cos2x.$

(b) Solve: $\frac{dy}{dx} + ycosx = \frac{1}{2}\sin 2x.$ **(14+6)**

21. (a) Find $L^{-1}\left[\frac{1}{S(S+1)(S+2)}\right]$.

(b) Solve $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = sint$ given that $y = \frac{dy}{dt} = 0$ when t =0. **(8+12)**

22. (a) Find the real roots of $x^3 - 2x - 5 = 0$using Newtons Raphson method**. (12+8)**

(b) State and prove Cancellation laws of groups.

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