SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
BCA. - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - I
20UCAAT1001 - Allied Mathematics I

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Prove the following implications by using truth tables:
   $[p \to (q \to r)] \Longrightarrow (p \to q) \to (p \to r)$
2. Prove that $\frac{\sin 7\theta}{\sin \theta} = 64\ cos^6\theta - 80\ cos^4\theta + 24\ cos^2\theta - 1.$
3. Expand tan 7 θ in terms of θ
4. Prove that $\sin h^{-1}x = \log(x + \sqrt{x^2+1})$
5. Find the Laplace Transform of cos 4t sin 3t.
6. Find the Laplace Transform of $\frac{\cos 3t - \cos 2t}{t}$
7. Find the inverse Lapalce transform of
   $log\frac{s^2+9}{s^2+1}$
8. Find $L^{-1}\left\{\frac{s+2}{(s-4)(s^2+1)}\right\}$

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Without constructing the truth tables, find the principal disjunctive normal forms of the following statements:
   $(i)\ (\neg p \to q) \bigwedge (q \longleftrightarrow p)$
   $(ii)(p \bigwedge q) \vee (\neg p \bigwedge q) \vee (q \bigwedge r)$
10. Expand $sin^3\theta cos^4\theta$ in terms of sines of multiples of θ
11. If $\sin(A + iB) = x + iy$ Prove that
    (i) $\frac{x^2}{cosh^2B} + \frac{y^2}{sinh^2B} = 1$
    (ii) $\frac{x^2}{sin^2A} - \frac{y^2}{cos^2A} = 1$
12. (i) State and prove change of scale property of Laplace transforms.
    (ii) Find the Laplace Transform of $t^2\cosh at$.
13. Find $L^{-1}\left\{\frac{s+3}{(s^2+6s+13)^2}\right\}$

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