B.C.A DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Allied Paper -I
ALLIED MATHEMATICS -I

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Construct the truth table for $\sim p \vee q$.
2. Let p : Dogs are bipeds and q : Human being are quadrupeds. Write the contra-positive of $p \Rightarrow q$.
3. Write the series expansion of $\tan n\theta$.
4. If $x = \cos\theta \ + i\sin\theta$, then what is the value of $x^n - \dfrac{1}{x^n}$?
5. Find the value of $\cosh^2 x \ - \sinh^2 x$.
6. Prove that $\cos ix \ = \cosh x$.
7. Find $L\left[5 - 2e^{-t}\right]$.
8. Find $L\left[t^{10}\right]$.
9. Find $L^{-1}\left[\dfrac{s}{s^2 + 49}\right]$.
10. Find $L^{-1}\left[\dfrac{1}{s-3} + \dfrac{1}{s}\right]$.
11. Define the biconditional proposition.
12. Find $L\left[\cos 5t\ \right]$.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Using truth table, show that $p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$.
14. Prove that $\dfrac{\cos 5\theta}{\cos\theta} = 1 - 12\sin^2\theta \ + 16\sin^4\theta$.
15. Show that $\cosh^{-1} x \ = \log\left[x + \sqrt{x^2 - 1}\ \right]$.
16. Find $L\left[\dfrac{\sin 3t \ \ \cos t}{t}\ \right]$.
17. Find $L^{-1}\left[\dfrac{1}{s\left(s^2 - 2s + 5\right)}\right]$.

18. Without using truth table, show that $p \Leftrightarrow q = (p \wedge q) \vee (\sim p \wedge \sim q)$.
19. Find $L^{-1}\left[\dfrac{s}{(s+2)^2+4}\right]$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Is the following argument valid?

    If the labour market is prefect, then the wages of all persons in a particular employment will be equal. But it is always the case that wages for such persons are not equal. Therefore, the labour market is not perfect.

21. Prove that

$$\cos^5\theta \, \sin^4\theta \; = \frac{1}{2^8}\left[\cos 9\theta \; + \cos 7\theta \; - 4\cos 5\theta \; - 4\cos 3\theta \; + 6\cos\theta \; \right]$$

22. Separate into real and imaginary parts of $\tan^{-1}(\alpha + i\beta)$.
23. (a) Find $L\left[t \; e^{-t}\sin t \; \right]$.

    (b) Find $L\left[t^2 \; e^{-3t}\right]$.

24. Find $L^{-1}\left[\dfrac{1}{s\,(s+1)\,(s+2)}\right]$.

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