B.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

I Year II Semester

Core Major - Paper III - CLASSICAL ALGEBRA

Time : 3 Hours Max. Marks : 75

SECTION A – (10 × 2 = 20 marks)

Answer any *TEN* questions

1. Show that $\frac{e+1}{e-1}=\frac{\frac{1}{1!}+\frac{1}{3!}+……….}{\frac{1}{2!}+\frac{1}{4!}+……..}$

2. Show that $log\frac{a+x}{a-x}=\left(\frac{2ax}{a^{2}+x^{2}}\right)+\frac{1}{3}\left(\frac{2ax}{a^{2}+x^{2}}\right)^{3}+\frac{1}{5}\left(\frac{2ax}{a^{2}+x^{2}}\right)^{5}+……….$

3. Show that the matrix $\left[\begin{matrix}\cos(θ)&sin θ\\-\sin(θ)&\cos(θ)\end{matrix}\right]$ is orthogonal.

4. Show that the matrix $\frac{1}{\sqrt{2}}\left[\begin{matrix}1&i\\-i&-1\end{matrix}\right]$ is unitary.

5. Solve the equation $x^{3}+6x+20=0$ one root being $1+3i.$

6. If $α and β $are the roots of $2x^{2}+3x+5=0$find $α+ β and αβ$.

7. Define reciprocal equation.

8. Transform the equation $3x^{3}+4x^{2}+5x-6=0$ into one in which the coefficient of $x^{3}$ is unity and all coefficients are integral.

9. State Fermat’s theorem.

10. State Wilson’s theorem.

11. Find the number of divisors of 480 excluding 1 and 480.

12. State Cayley-Hamilton theorem.

SECTION B – (5 × 5 = 25 marks)

Answer any *FIVE* questions

13. Find the sum to infinity of the series $\frac{2^{2}}{1!}+\frac{3^{2}}{2!}+\frac{4^{2}}{3!}+……..$

14. Verify Cayley-Hamilton theorem for the matrix $\left[\begin{matrix}1&0&3\\2&1&-1\\1&-1&1\end{matrix}\right]$

15. Solve the equation $2x^{3}-x^{2}-22x-24=0$ two of whose roots are in the ratio 3:4

16. Find the equation whose roots are the roots of the equation $x^{4}-x^{3}-10x^{2}+4x+24=0$ increased by 2 and hence solve the equation.

17. Find the highest power of 3 dividing 1000$!$.

18. Find the sum to infinity of the series $\frac{2}{6}+\frac{2.5}{6.12}+\frac{2.5.8}{6.12.18}+………$

19.Find the remainder obtained in dividing $2^{46}$ by 47.

SECTION C – (3 × 10 = 30 marks)

Answer any *THREE* questions

20. Show that $\frac{1}{1.2.3}-\frac{1}{2.3.4}+\frac{1}{3.4.5}-\frac{1}{4.5.6}+…….=2log2-\frac{1}{4}$

21. Find the Eigen values and Eigen vectors of the matrix $\left[\begin{matrix}2&0&-1\\0&2&-2\\1&-1&2\end{matrix}\right]$

22. Solve the equation $x^{4}-2x^{3}-21x^{2}+22x+40=0$ whose roots are in arithmetic progression.

23. Solve $6x^{6}-25x^{3}-31x^{4}-31x^{2}+25x-6=0$

24.Show that $n^{13}-n$ is divisible by 2730.

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