

1ST SEM./COMMON TO ALL ./2024(W)NEW

TH3 Mathematics-I

Full Marks: 70

Time- 3 Hrs

Answer any four Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
- Evaluate $\cos 75^\circ$.
 - Evaluate $\tan 840^\circ$.
 - Prove that $\sqrt{\frac{1-\cos 2A}{2}} = \sin A$.
 - Define modulus function with graph.
 - Find derivative of the function $y = e^{5x+4}$.
 - Evaluate $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 7x}$.
 - Evaluate $\lim_{x \rightarrow 2} \frac{x^3-8}{x-2}$.
 - Find the conjugate of $\frac{1}{2+i}$.
 - If $y = x^4 + e^x$, then find $\frac{dy}{dx}$.
 - Find the value of i^{4n+2} .
2. Answer Any **Six** Questions 5 x 6
- If $A + B + C = \pi$, then prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$.
 - Find the maximum and minimum value of $5 \sin x + 12 \cos x$.
 - If $y = x^y$, then find $\frac{dy}{dx}$.
 - Find the square root of $3 + 4i$.
 - Find the co-efficient of $\frac{1}{y^{10}}$ in the expansion $(y^3 + \frac{a^7}{y^5})^{10}$.
 - If $C(20, r+6) = C(20, r+2)$, then find r .
 - Resolve into partial fraction $\frac{x}{(x+1)(x+3)}$.

Answer Any **Two** Questions

3. a. Show that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$. 5+5
b. If $\sin A = k \sin B$, Prove that $\tan \frac{A-B}{2} = \frac{K-1}{K+1} \tan \frac{A+B}{2}$.
4. a. Evaluate $\lim_{x \rightarrow 0} \frac{5x \cos x - \sin x}{7x + 5 \sin x}$. 5+5
b. Evaluate $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{4^x - 3^x}$.
5. a. Find $\frac{dy}{dx}$ if $y = \sqrt{\sin \sqrt{x}}$ 5+5
b. Find derivative of $\frac{e^x - \sin x}{x}$.
6. a. Find the term independent of x in the expansion $(\frac{x^2}{3} - \frac{4}{x^2})^6$. 5+5
b. If $(1 - \omega + \omega^2)^5 + (1 + \omega - \omega^2)^5 = 32$.