International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring-2018 | Program: B.Sc. Engg. (EEE)
Course Code: Math-1202 | Course Title: Math-II
Time: 2 hours 30 minutes | Full Marks: 50

Part A

[Answer any ***two*** questions from the followings; figures in the right margin indicate full marks.]

1(a). Prove that the shortest distance of between two symmetrical straight line $\frac{x-x_1}{l_1}=\frac{y-y_1}{m_1}=\frac{z-z_1}{n_1}$ & $\frac{x-x_2}{l_2}=\frac{y-y_2}{m_2}=\frac{z-z_2}{n_2}$ is $S.D = l(x_2-x_1)+m(y_2-y_1)+n(z_2-z_1)$, where $l=\frac{m_1n_2-m_2n_1}{sin\theta}, m=\frac{n_1l_2-n_2l_1}{sin\theta}, n=\frac{l_1m_2-l_2m_1}{sin\theta}$ 4

1(b). Find the equation of the straight line which bisect angles between the lines $\frac{x}{l}=\frac{y}{m}=\frac{z}{n}$ & $\frac{x}{l_1}=\frac{y}{m_1}=\frac{z}{n_1}$ 3

1(c). Show that the lines $3x-2y+13=0=y+3z-26$ & $\frac{x+4}{5}=\frac{y-1}{-3}=\frac{z-3}{1}$ are perpendicular. 3

2(a). Reduce the equation $x^2+2y^2-3z^2-12xy-4yz+8zx+1=0$ to the standard form and identify the conicoids. 7

2(b). Find the equation of the of the two spheres which passes through the circle $x^2+y^2+z^2=1,\ x+2y+3z=4$ *and touches* $y=0$ plane. 3

3(a). Find the equation to the cone whose vertex is the origin and which passes through the curve of the intersection of the plane $lx+my+nz=p$ and the surface $ax^2+by^2+cz^2=1$ 3

3(b). Find the shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ & $\frac{x+3}{3}=\frac{y+7}{2}=\frac{z-6}{4}$ 5

3(c). Find the equation of the right circular cylinder of radius 2, whose axis is the line $\frac{1}{2}(x-1)=\frac{y}{3}=z-3$ 2

Part B

[Answer any ***three*** questions from the followings; figures in the right margin indicate full marks.]

4(a). Show that a real value of x will satisfy the equation $\frac{1-ix}{1+ix}=a-ib$, if $a^2+b^2=1$ 3

4(b). Sate the Demoivre's theorem and then prove that $(\cos\theta+i\sin\theta)^n=\cos n\theta+\sin n\theta$, when n is positive or negative intiger 3

4(c). If $(1+x)^n=p_0+p_1x+p_2x^2+\cdots\ .....to\ infinity$ then show that 4

(i) $p_0 - p_2 + p_4 - \cdots \ldots\ldots\ldots = 2^{\frac{n}{2}} \cos\frac{n\pi}{4}$

(ii) $p_1 - p_3 + p_5 - \cdots \ldots\ldots\ldots = 2^{\frac{n}{2}} \sin\frac{n\pi}{4}$

5(a). Prove that $\cosh x = \frac{1}{2}(e^{x} + e^{-x})$ & $\sinh x = \frac{1}{2}(e^{x} - e^{-x})$ 2

5(b). Prove that the General value of $\sinh^{-1} z = in\pi + (-1)^n \log(z + \sqrt{z^2+1})$ 4

5(c). Prove that $\sec(x+iy) = \frac{2\cos x \cosh y}{\cos 2x + \cosh 2y} + i\frac{2\sin x \sinh y}{\cos 2x + \cosh 2y}$ 4

6(a). Prove that $\log(1 + i\tan\theta) = \log\sec\theta + i\theta$ and hence deduce the expansion of θ in terms of $\tan\theta$ 4

6(b). Find the sum of the series upto n terms by difference method for 3

$$\tan^{-1}\frac{1}{2.1^2} + \tan^{-1}\frac{1}{2.2^2} + \tan^{-1}\frac{1}{2.3^2} + \cdots \ldots\ldots\ldots upto\ n$$

6(c). Find sum of the seris by $C + iS$ method for 3

$$\cos\theta\sin\theta + \cos^2\theta\sin 2\theta + \cos^3\theta\sin\theta + \cdots \ldots\ldots up\ to\ infity$$

7(a). Solve the equation $x^7 + x^4 + x^3 + 1 = 0$ by using De Moivres theorem. 4

7(b). If $\tan(\alpha + i\beta) = x + iy$, then prove that $x^2 + y^2 + 2x\cot 2\alpha = 1$ & $x^2 + y^2 - 2y\coth 2\beta = -1$ 3

7(c). Find the sum for the 3

$$\tan\alpha + 2\tan 2\alpha + 2^2\tan 2^2\alpha + \cdots \ldots\ldots up\ to\ n$$