Code No: 07A4BS02 **R07** **Set No. 2**

II B.Tech II Semester Examinations,April/May 2012
MATHEMATICS - III
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)dz$ along the two paths :
   i. x = t+1, y = $2t^2$-1
   ii. the straight line joining (1-i) and (2+i) .
   (b) Use Cauchys integral formula to calculate :
   $\int_C \frac{e^{-z}}{(z+1)} dz$ where C is the circle $|z| = 2$ [10+6]

2. (a) Express f(x) = $5x^3$ + x in terms of Legendre's polynomials .
   (b) Prove that $\int_{-1}^{1} x^m P_n(x)dx = 0, if$ m, n are positive integers and m < n. [8+8]

3. Evaluate $\int_C \frac{f'(z)}{f(z)} dz$ by using Augument principle where C is a simple closed curve C and f(z) = z^5 - $8z^2$i + 2z - 3 + 5i. [16]

4. (a) Prove that the function f(z) = $\sqrt{|xy|}$ is not analytic at the origin even though the C - R equations are satisfied there at.
   (b) Find the analytic function whose real part is y / (x^2 + y^2). [8+8]

5. (a) Expand $f(z) = \frac{z-1}{z^2}$ in a Taylor's series in power of (z - 1) and determine the region of convergence.
   (b) Determine the poles of the function $f(z) = \frac{e^z}{z^2+\pi^2}$ [8+8]

6. Show that $\int_0^{2\pi} \frac{d\theta}{a+b\sin\theta} = \int_0^{2\pi} \frac{d\theta}{a+b\,cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$ using reside theorem. [16]

7. (a) Prove that the real part of the principal value of $i^{log\ (1+i)}$ is $e^{-\frac{\pi^2}{8}}$ cos $\left(\frac{\pi}{4} \log 2\right)$
   (b) If tan(x + iy) = sin (A +iB). Prove that $\frac{\sin 2x}{\sinh 2y} = \frac{Tan\,A}{Tanh\,B}$ [8+8]

8. (a) Prove that the transformation w = $\frac{1}{z}$ maps every straight line or circle on to a circle or straight line.
   (b) Define bilinear transformation. Prove that the bilinear transformation is conformal. [8+8]

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Code No: 07A4BS02 **R07** **Set No. 4**

II B.Tech II Semester Examinations,April/May 2012
MATHEMATICS - III
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)dz$ along the two paths :
   i. x = t+1, y = $2t^2$-1
   ii. the straight line joining (1-i) and (2+i) .
   (b) Use Cauchys integral formula to calculate :
   $\int_C \frac{e^{-z}}{(z+1)} dz$ where C is the circle $|z| = 2$ [10+6]

2. (a) Prove that the function f(z) = $\sqrt{|xy|}$ is not analytic at the origin even though the C - R equations are satisfied there at.
   (b) Find the analytic function whose real part is y / (x^2 + y^2). [8+8]

3. (a) Express f(x) = $5x^3$ + x in terms of Legendre's polynomials .
   (b) Prove that $\int_{-1}^{1} x^m P_n(x)dx = 0, if$ m, n are positive integers and m < n. [8+8]

4. (a) Prove that the transformation w = $\frac{1}{z}$ maps every straight line or circle on to a circle or straight line.
   (b) Define bilinear transformation. Prove that the bilinear transformation is conformal. [8+8]

5. Evaluate $\int_C \frac{f'(z)}{f(z)} dz$ by using Augument principle where C is a simple closed curve C and f(z) = z^5 - $8z^2$i + 2z - 3 + 5i. [16]

6. Show that $\int_0^{2\pi} \frac{d\theta}{a+b\sin\theta} = \int_0^{2\pi} \frac{d\theta}{a+b\,cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$ using reside theorem. [16]

7. (a) Expand $f(z) = \frac{z-1}{z^2}$ in a Taylor's series in power of (z - 1) and determine the region of convergence.
   (b) Determine the poles of the function $f(z) = \frac{e^z}{z^2+\pi^2}$ [8+8]

8. (a) Prove that the real part of the principal value of $i^{log\ (1+i)}$ is $e^{-\frac{\pi^2}{8}}$ cos $\left(\frac{\pi}{4}\log 2\right)$
   (b) If tan(x + iy) = sin (A +iB). Prove that $\frac{\sin 2x}{\sinh 2y} = \frac{Tan\,A}{Tanh\,B}$ [8+8]

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Code No: 07A4BS02 **R07** **Set No. 1**

II B.Tech II Semester Examinations,April/May 2012
MATHEMATICS - III
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Prove that the transformation w = $\frac{1}{z}$ maps every straight line or circle on to a circle or straight line.
   (b) Define bilinear transformation. Prove that the bilinear transformation is conformal. [8+8]

2. (a) Expand $f(z) = \frac{z-1}{z^2}$ in a Taylor's series in power of (z - 1) and determine the region of convergence.
   (b) Determine the poles of the function $f(z) = \frac{e^z}{z^2+\pi^2}$ [8+8]

3. Show that $\int_0^{2\pi} \frac{d\theta}{a+b\sin\theta} = \int_0^{2\pi} \frac{d\theta}{a+b\,cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$ using reside theorem. [16]

4. (a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)dz$ along the two paths :
      i. x = t+1, y = $2t^2$-1
      ii. the straight line joining (1-i) and (2+i) .
   (b) Use Cauchys integral formula to calculate :
   $\int_C \frac{e^{-z}}{(z+1)}dz$ where C is the circle $|z| = 2$ [10+6]

5. (a) Prove that the real part of the principal value of $i^{log\ (1+i)}$ is $e^{-\frac{\pi^2}{8}}$ cos $\left(\frac{\pi}{4}\log 2\right)$
   (b) If tan(x + iy) = sin (A +iB). Prove that $\frac{\sin 2x}{\sinh 2y} = \frac{Tan\,A}{Tanh\,B}$ [8+8]

6. (a) Prove that the function f(z) = $\sqrt{|xy|}$ is not analytic at the origin even though the C - R equations are satisfied there at.
   (b) Find the analytic function whose real part is y / (x^2 + y^2). [8+8]

7. (a) Express f(x) = $5x^3$ + x in terms of Legendre's polynomials .
   (b) Prove that $\int_{-1}^{1} x^m P_n(x)dx = 0\,, if$ m, n are positive integers and m < n. [8+8]

8. Evaluate $\int_C \frac{f'(z)}{f(z)}dz$ by using Augument principle where C is a simple closed curve C and f(z) = z^5 - $8z^2$i + 2z - 3 + 5i. [16]

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Code No: 07A4BS02 **R07** **Set No. 3**

II B.Tech II Semester Examinations,April/May 2012
MATHEMATICS - III
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)dz$ along the two paths :
   i. x = t+1, y = $2t^2$-1
   ii. the straight line joining (1-i) and (2+i) .
   (b) Use Cauchys integral formula to calculate :
   $\int_C \frac{e^{-z}}{(z+1)} dz$ where C is the circle $|z| = 2$ [10+6]

2. Evaluate $\int_C \frac{f'(z)}{f(z)} dz$ by using Augument principle where C is a simple closed curve C and f(z) = z^5 - $8z^2$i + 2z - 3 + 5i. [16]

3. (a) Prove that the real part of the principal value of $i^{log\ (1+i)}$ is $e^{-\frac{\pi^2}{8}}$ cos $\left(\frac{\pi}{4} \log 2\right)$
   (b) If tan(x + iy) = sin (A +iB). Prove that $\frac{\sin 2x}{\sinh 2y} = \frac{Tan\, A}{Tanh\, B}$ [8+8]

4. (a) Prove that the function f(z) = $\sqrt{|xy|}$ is not analytic at the origin even though the C - R equations are satisfied there at.
   (b) Find the analytic function whose real part is y / (x^2 + y^2). [8+8]

5. (a) Expand $f(z) = \frac{z-1}{z^2}$ in a Taylor's series in power of (z - 1) and determine the region of convergence.
   (b) Determine the poles of the function $f(z) = \frac{e^z}{z^2+\pi^2}$ [8+8]

6. (a) Express f(x) = $5x^3$ + x in terms of Legendre's polynomials .
   (b) Prove that $\int_{-1}^{1} x^m P_n(x)dx = 0, if$ m, n are positive integers and m < n. [8+8]

7. (a) Prove that the transformation w = $\frac{1}{z}$ maps every straight line or circle on to a circle or straight line.
   (b) Define bilinear transformation. Prove that the bilinear transformation is conformal. [8+8]

8. Show that $\int_0^{2\pi} \frac{d\theta}{a+b\sin\theta} = \int_0^{2\pi} \frac{d\theta}{a+b\,cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$ using reside theorem. [16]

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