Code No: R05222101 **R05** **Set No. 2**

II B.Tech II Semester Examinations,November 2010
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) When n is a positive integer show that $J_n(x) = \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)d\theta$.
   (b) Show that $x^3 = \frac{2}{5}P_3(x) + \frac{3}{5}P_1(x)$. [8+8]

2. (a) If $f(x) = K\, e^{-|x|}$ is a probability density function in $-\infty < x < \infty$, find
      i. The value of k,
      ii. the variance
      iii. The probability between 0 and 4.
   (b) Derive the mean and variance of the Binomial distribution. [8+8]

3. (a) Prove that the contraction of the inter product of the tensors A^P and B_q is invariant.
   (b) Obtain the law of transformation christoffel symbol of second kind. [8+8]

4. (a) State and derive Laurent's series for an analytic function f (z).
   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region.
      i. $0 < |z - 1| < 1$
      ii. $1 < |z| < 2$. [8+8]

5. (a) Evaluate by residue theorem $\int_0^{2\pi} \frac{d\theta}{(2+\cos\theta)}$.
   (b) Use the method of contour integration to evaluate $\int_{-\infty}^{\infty} \frac{x^2dx}{(x^2+a^2)^3}$. [8+8]

6. (a) Define analyticity of a complex function at a point P and in a domain D. Prove that the real and imaginary parts of an analytic function satisfy Cauchy Riemann Equations.
   (b) Show that the function defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at $z \neq 0$ and $f(0) = 0$ is continuous and satisfies C-R equations at the origin but $f'(0)$ does not exist. [8+8]

7. (a) Two dice are thrown. Let A be the event that the sum of the points on face is 9. Let B be the event that at least one number is 6. Find the probability.
      i. $P(A \cap B)$
      ii. $P(A \cup B)$

iii. $P(A \cap B^c)$

(b) Let X,Y,Z be three coins in a box. Suppose X is a fair coin. Y is two headed, and Z is weighted so that the probability of heads is 1/3. A coin is selected at random and is tossed.

i. If head appears, find the probability that it is fair.

ii. If tail appears, find the probability that it is the coin Z. [8+8]

8. (a) Find and plot the image of triangular region with vertices at (0,0), (1,0) (0,1) under the transformation w=(1–i) z+3.

(b) If $w = \frac{1+iz}{1-iz}$ find the image of |z| <1. [8+8]

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Code No: R05222101 **R05** **Set No. 4**

II B.Tech II Semester Examinations,November 2010
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define analyticity of a complex function at a point P and in a domain D. Prove that the real and imaginary parts of an analytic function satisfy Cauchy Riemann Equations.
   (b) Show that the function defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at $z \neq 0$ and f(0) = 0 is continuous and satisfies C-R equations at the origin but f′(0) does not exist. [8+8]

2. (a) If f(x) = K $e^{-|x|}$ is a probability density function in $-\infty <$ x $<\infty$, find
      i. The value of k,
      ii. the variance
      iii. The probability between 0 and 4.
   (b) Derive the mean and variance of the Binomial distribution. [8+8]

3. (a) Two dice are thrown. Let A be the event that the sum of the points on face is 9. Let B be the event that at least one number is 6. Find the probability.
      i. $P(A \cap B)$
      ii. $P(A \cup B)$
      iii. $P(A \cap B^c)$
   (b) Let X,Y,Z be three coins in a box. Suppose X is a fair coin. Y is two headed, and Z is weighted so that the probability of heads is 1/3. A coin is selected at random and is tossed.
      i. If head appears, find the probability that it is fair.
      ii. If tail appears, find the probability that it is the coin Z. [8+8]

4. (a) Prove that the contraction of the inter product of the tensors A^P and B_q is invariant.
   (b) Obtain the law of transformation christoffel symbol of second kind. [8+8]

5. (a) Find and plot the image of triangular region with vertices at (0,0), (1,0) (0,1) under the transformation w=(1–i) z+3.
   (b) If $w = \frac{1+iz}{1-iz}$ find the image of |z| <1. [8+8]

6. (a) State and derive Laurent's series for an analytic function f (z).
   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region.
      i. 0 < | z – 1 | < 1

ii. $1 < | z | < 2$. [8+8]

7. (a) Evaluate by residue theorem $\int_0^{2\pi} \frac{d\theta}{(2+cos\theta)}$.

   (b) Use the method of contour integration to evaluate $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+a^2)^3}$. [8+8]

8. (a) When n is a positive integer show that $J_n(x) = \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)d\theta$.

   (b) Show that $x^3 = \frac{2}{5}P_3(x) + \frac{3}{5}P_1(x)$. [8+8]

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Code No: R05222101 **R05** **Set No. 1**

II B.Tech II Semester Examinations,November 2010
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Prove that the contraction of the inter product of the tensors A^P and B_q is invariant.
   (b) Obtain the law of transformation christoffel symbol of second kind. [8+8]

2. (a) Two dice are thrown. Let A be the event that the sum of the points on face is 9. Let B be the event that at least one number is 6. Find the probability.
      i. $P(A \cap B)$
      ii. $P(A \cup B)$
      iii. $P(A \cap B^c)$
   (b) Let X,Y,Z be three coins in a box. Suppose X is a fair coin. Y is two headed, and Z is weighted so that the probability of heads is 1/3. A coin is selected at random and is tossed.
      i. If head appears, find the probability that it is fair.
      ii. If tail appears, find the probability that it is the coin Z. [8+8]

3. (a) Evaluate by residue theorem $\int_0^{2\pi} \frac{d\theta}{(2+cos\theta)}$.
   (b) Use the method of contour integration to evaluate $\int_{-\infty}^{\infty} \frac{x^2dx}{(x^2+a^2)^3}$. [8+8]

4. (a) When n is a positive integer show that J_n(x) $= \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)d\theta$.
   (b) Show that $x^3 = \frac{2}{5}P_3(x) + \frac{3}{5}\ P_1(x)$. [8+8]

5. (a) If f(x) = K $e^{-|x|}$ is a probability density function in $-\infty<$ x $<\infty$, find
      i. The value of k,
      ii. the variance
      iii. The probability between 0 and 4.
   (b) Derive the mean and variance of the Binomial distribution. [8+8]

6. (a) State and derive Laurent's series for an analytic function f (z).
   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region.
      i. 0 < | z – 1 | < 1
      ii. 1 < | z | < 2. [8+8]

7. (a) Find and plot the image of triangular region with vertices at (0,0), (1,0) (0,1) under the transformation w=(1–i) z+3.

   (b) If $w = \frac{1+iz}{1-iz}$ find the image of |z| <1. [8+8]

8. (a) Define analyticity of a complex function at a point P and in a domain D. Prove that the real and imaginary parts of an analytic function satisfy Cauchy Riemann Equations.

   (b) Show that the function defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at z $\neq$ 0 and f(0) = 0 is continuous and satisfies C-R equations at the origin but f$'$(0) does not exist. [8+8]

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Code No: R05222101 **R05** **Set No. 3**

II B.Tech II Semester Examinations,November 2010
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Evaluate by residue theorem $\int_0^{2\pi} \frac{d\theta}{(2+cos\theta)}$.
   (b) Use the method of contour integration to evaluate $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+a^2)^3}$. [8+8]

2. (a) If f(x) = K $e^{-|x|}$ is a probability density function in $-\infty < x < \infty$, find
      i. The value of k,
      ii. the variance
      iii. The probability between 0 and 4.
   (b) Derive the mean and variance of the Binomial distribution. [8+8]

3. (a) Two dice are thrown. Let A be the event that the sum of the points on face is 9. Let B be the event that at least one number is 6. Find the probability.
      i. $P(A \cap B)$
      ii. $P(A \cup B)$
      iii. $P(A \cap B^c)$
   (b) Let X,Y,Z be three coins in a box. Suppose X is a fair coin. Y is two headed, and Z is weighted so that the probability of heads is 1/3. A coin is selected at random and is tossed.
      i. If head appears, find the probability that it is fair.
      ii. If tail appears, find the probability that it is the coin Z. [8+8]

4. (a) When n is a positive integer show that $J_n(\text{x}) = \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)d\theta$.
   (b) Show that $\text{x}^3 = \frac{2}{5}\text{P}_3(\text{x}) + \frac{3}{5}\text{P}_1(\text{x})$. [8+8]

5. (a) State and derive Laurent's series for an analytic function f (z).
   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region.
      i. 0 < | z – 1 | < 1
      ii. 1 < | z | < 2. [8+8]

6. (a) Find and plot the image of triangular region with vertices at (0,0), (1,0) (0,1) under the transformation w=(1–i) z+3.
   (b) If $w = \frac{1+iz}{1-iz}$ find the image of |z| <1. [8+8]

7. (a) Prove that the contraction of the inter product of the tensors A^P and B_q is invariant.
   (b) Obtain the law of transformation christoffel symbol of second kind. [8+8]

8. (a) Define analyticity of a complex function at a point P and in a domain D. Prove that the real and imaginary parts of an analytic function satisfy Cauchy Riemann Equations.
   (b) Show that the function defined by $f(z) = \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}$ at z $\neq$ 0 and f(0) = 0 is continuous and satisfies C-R equations at the origin but f$'$(0) does not exist. [8+8]

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