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

**II B.Tech II Semester Examinations,April/May 2012**
**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) State and derive Laurent's series for an analytic function f (z) in a region R.
   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region, as Laurent's series
      i. $0 < | z - 1 | < 1$
      ii. $1 < | z | < 2$. [8+8]

2. (a) For the continuous probability function $f(x) = kx^2e^{-x}$ when $x \geq 0$, find
      i. k
      ii. mean
      iii. variance.
   (b) Derive the formula to find Mean and Variance of Binomial distribution. [8+8]

3. (a) Out of 10 girls in a class , 3 have blue eyes. If 2 of the girls are chosen at random, what is the probability that
      i. both have blue eyes
      ii. at least one has blue eyes.
   (b) Define conditional probability. Give an example. State the general multiplicative rule and special multiplication rule ( when the events are independent). [8+8]

4. (a) Prove that the transformation w=sinz maps the families of lines x=constant and y=constant in to two families of confocal conics.
   (b) Find the bilinear transformation which maps the points (i, -i, 1) of the z-plane into (0,1, $\infty$) of the w-plane. [8+8]

5. Define:

(a) Fundamental tensor

(b) Reciprocal tensor.

Determine the Reciprocal and fundamental tensor in cylindrical and spherical co-ordinates. [10+6]

6. (a) Show that $\int_0^1 x^m (\log x)^n \, dx = \frac{(-1)^n n!}{(m+1)^{n+1}}$ where n is a positive interger and m>–1.

   (b) Show that $\beta$(m,n)= $\int_0^\infty \frac{y^{n-1}}{(1+y)^{m+n}} dy$.

   (c) Show that $\int_0^\infty x^4 e^{-x^2} dx = \frac{3\sqrt{\pi}}{8}$. [6+5+5]

7. (a) If f(z) = u+iv is analytic function and u - v = $e^x$ (cos y - sin y), find f(z) in terms of z.

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

8. (a) Find the poles and the corresponding residues of the function $\frac{1}{(z^2-1)^3}$.

   (b) Evaluate $\int_C \frac{(4-3z)}{z(z-1)(z-2)} dz$ where C is |z| = 3/2 by residues theorem. [8+8]

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

**II B.Tech II Semester Examinations,April/May 2012**
**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) Out of 10 girls in a class , 3 have blue eyes. If 2 of the girls are chosen at random, what is the probability that
   i. both have blue eyes
   ii. at least one has blue eyes.

   (b) Define conditional probability. Give an example. State the general multiplicative rule and special multiplication rule ( when the events are independent). [8+8]

2. Define:
   (a) Fundamental tensor
   (b) Reciprocal tensor.

   Determine the Reciprocal and fundamental tensor in cylindrical and spherical coordinates. [10+6]

3. (a) For the continuous probability function $f(x) = kx^2e^{-x}$ when $x \geq 0$, find
   i. k
   ii. mean
   iii. variance.

   (b) Derive the formula to find Mean and Variance of Binomial distribution. . [8+8]

4. (a) Show that $\int\limits_0^1 x^m (\log x)^n\, dx = \frac{(-1)^n n!}{(m+1)^{n+1}}$ where n is a positive interger and m>–1.

   (b) Show that $\beta$(m,n)= $\int\limits_0^\infty \frac{y^{n-1}}{(1+y)^{m+n}} dy$.

(c) Show that $\int\limits_0^{\infty} x^4 e^{-x^2} dx = \frac{3\sqrt{\pi}}{8}$. [6+5+5]

5. (a) State and derive Laurent's series for an analytic function f (z) in a region R.

   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region, as Laurent's series.

      i. $0 < | z - 1 | < 1$

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

6. (a) Find the poles and the corresponding residues of the function $\frac{1}{(z^2-1)^3}$.

   (b) Evaluate $\int\limits_C \frac{(4-3z)}{z(z-1)(z-2)} dz$ where C is $|z| = 3/2$ by residues theorem. [8+8]

7. (a) If f(z) = u+iv is analytic function and u - v = $e^x$ (cos y - sin y), find f(z) in terms of z.

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

8. (a) Prove that the transformation w=sinz maps the families of lines x=constant and y=constant in to two families of confocal conics.

   (b) Find the bilinear transformation which maps the points (i, -i, 1) of the z-plane into (0,1, ∞) of the w-plane. [8+8]

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

**II B.Tech II Semester Examinations,April/May 2012**
**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. Define:
   (a) Fundamental tensor
   (b) Reciprocal tensor.

   Determine the Reciprocal and fundamental tensor in cylindrical and spherical co-ordinates. [10+6]

2. (a) Prove that the transformation w=sinz maps the families of lines x=constant and y=constant in to two families of confocal conics.
   (b) Find the bilinear transformation which maps the points (i, -i, 1) of the z-plane into (0,1, $\infty$) of the w-plane. [8+8]

3. (a) If f(z) = u+iv is analytic function and u - v = $e^x$ (cos y - sin y), find f(z) in terms of z.
   (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]

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

5. (a) Show that $\int_0^1 x^m (\log x)^n \, dx = \frac{(-1)^n n!}{(m+1)^{n+1}}$ where n is a positive interger and m>–1.
   (b) Show that $\beta$(m,n)= $\int_0^\infty \frac{y^{n-1}}{(1+y)^{m+n}} dy$.
   (c) Show that $\int_0^\infty x^4 e^{-x^2} dx = \frac{3\sqrt{\pi}}{8}$. [6+5+5]

6. (a) For the continuous probability function f(x) = $kx^2e^{-x}$ when $x \geq 0$, find
      i. k
      ii. mean
      iii. variance.
   (b) Derive the formula to find Mean and Variance of Binomial distribution. [8+8]

7. (a) Out of 10 girls in a class , 3 have blue eyes. If 2 of the girls are chosen at random, what is the probability that
    i. both have blue eyes
    ii. at least one has blue eyes.
   (b) Define conditional probability. Give an example. State the general multiplicative rule and special multiplication rule ( when the events are independent). [8+8]

8. (a) Find the poles and the corresponding residues of the function $\frac{1}{(z^2-1)^3}$.
   (b) Evaluate $\int\limits_C \frac{(4-3z)}{z(z-1)(z-2)}dz$ where C is |z| = 3/2 by residues theorem. [8+8]

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

**II B.Tech II Semester Examinations,April/May 2012**
**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) Out of 10 girls in a class , 3 have blue eyes. If 2 of the girls are chosen at random, what is the probability that
   i. both have blue eyes
   ii. at least one has blue eyes.

   (b) Define conditional probability. Give an example. State the general multiplicative rule and special multiplication rule ( when the events are independent). [8+8]

2. (a) Show that $\int_0^1 x^m (\log x)^n \, dx = \frac{(-1)^n n!}{(m+1)^{n+1}}$ where n is a positive interger and m>–1.

   (b) Show that $\beta$(m,n)= $\int_0^\infty \frac{y^{n-1}}{(1+y)^{m+n}} dy$.

   (c) Show that $\int_0^\infty x^4 e^{-x^2} dx = \frac{3\sqrt{\pi}}{8}$. [6+5+5]

3. (a) Find the poles and the corresponding residues of the function $\frac{1}{(z^2-1)^3}$.

   (b) Evaluate $\int_C \frac{(4-3z)}{z(z-1)(z-2)} dz$ where C is |z| = 3/2 by residues theorem. [8+8]

4. (a) Prove that the transformation w=sinz maps the families of lines x=constant and y=constant in to two families of confocal conics.

   (b) Find the bilinear transformation which maps the points (i, -i, 1) of the z-plane into (0,1, $\infty$) of the w-plane. [8+8]

5. (a) State and derive Laurent's series for an analytic function f (z) in a region R.

   (b) Expand $\frac{1}{(z^2-3z+2)}$ in the region, as Laurent's series.
   i. $0 < | z - 1 | < 1$
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   (a) Fundamental tensor

   (b) Reciprocal tensor.

   Determine the Reciprocal and fundamental tensor in cylindrical and spherical coordinates. [10+6]

7. (a) If f(z) = u+iv is analytic function and u - v = $e^x$ (cos y - sin y), find f(z) in terms of z.

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      i. k
      ii. mean
      iii. variance.

   (b) Derive the formula to find Mean and Variance of Binomial distribution. [8+8]

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