Code No: 07A4BS04 **R07** **Set No. 2**

II B.Tech II Semester Examinations,APRIL 2011
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) Expand f(z) $=\frac{z-1}{z+1}$ as a Taylor's series.
   i. about the point z=0
   ii. about the point z=1
   Determine the region of convergence in each case.
   iii. if f(z) $=\frac{z+4}{(z+3)(z-1)^2}$, find Laurent's series expansions in.
   A. $0 < |z-1| < 4$ and
   B. $|z-1| > 4$ [8+8]

2. (a) Two dice are thrown together. Find the probability that
   i. the sum of numbers on their faces is 9
   ii. the numbers on their faces are both odd
   iii. the numbers on their faces are same.

   (b) A distributor receives 20%, 15%, 35% and 30% of eggs from four poultries A,B,C,D which contains rotten eggs of 1%, 2%, 2% and 1% in the supplies from A,B,C,D respectively. A randomly chosen egg was found to be rotten. What is the probability that such egg came from the poultry C? [8+8]

3. (a) When n is a positive integer , Prove that $\frac{d}{dx}\left[x^n J_n\left(\mathrm{X}\right)\right] = x^n\, J_{n-1}\left(\mathrm{X}\right)$ Hence show that $J_{n-1}\left(\mathrm{X}\right) = \frac{n}{x} J_n\left(\mathrm{X}\right) + J'_{n(x)}$

   (b) Prove that $\frac{d}{dx}\left[x^n J_n\left(x\right)\right] = x^n J_{n-1}\left(x\right)$ Hence show that $J_{n-1}\left(x\right) = \frac{n}{x} J_n\left(x\right) - J'_{n(x)}$. [8+8]

4. (a) Evaluate $\int\limits_c \frac{e^z dz}{(z^2+\pi^2)^2}$ where e is the circle $|z| = 4$ by using Cauchy's integral formula.

   (b) Evaluate $\int_c \frac{z\,dz}{(z^2-6z+25)^2}$ where C is $|z-(3+4i)| = 9$ using Cauchys integral formula. [8+8]

5. (a) Discuss the transformation w = e^z and show that the region between the real axis and the line y $=\pi$ in the z- plane is transformed to upper half of the w - plane.

   (b) Determine bilinear transformation which map the points z = 0, 1, ∞ into w = -5,-1, 3 Find the critical and fixed points of the transformation. [8+8]

6. (a) write down the the law of transformation for the tensors
   i. $\mathrm{A}_{\mathrm{i}}^{\mathrm{kj}}$

ii. C_{mn}

(b) Define Christoffel symbol of second kind. If $(ds)^2 = (dr)^2 + r^2(d\theta)^2 + r^2\sin^2\theta\,(d\varphi)^2$, then find the value of [1 ,22] and [3,13] [8+8]

7. (a) Find all values of K such that f(z) = $e^x(\cos ky + i \sin k\,y)$ is analytic

(b) Find the analytic function whose real part is $\frac{x}{x^2+y^2}$

(c) Find all the roots of the equation cos z = 2. [5+5+6]

8. (a) Let X be a continuous random variable with probability function

$$\begin{aligned} f(x) &= ax && 0 \le x \le 1 \\ &= a && 1 \le x \le 1 \\ &= -ax + 3a && 2 \le x \le 3 \\ &= 0 && elsewhere \end{aligned}$$

Determine a and compute P(X$\le$ 1.5)

(b) The average life of a bulb is 1000 hours and standard deviation is 300 hours. If X is the life period of a bulb which is distributed normally, find the probability that a randomly picked bulb will last

i. less than 500 hours

ii. more than 600 hours

iii. between 700 and 800 hours. [8+8]

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Code No: 07A4BS04 **R07** **Set No. 4**

II B.Tech II Semester Examinations,APRIL 2011
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) Let X be a continuous random variable with probability function
$$\begin{aligned} f(x) &= ax && 0 \le x \le 1 \\ &= a && 1 \le x \le 1 \\ &= -ax + 3a && 2 \le x \le 3 \\ &= 0 && elsewhere \end{aligned}$$
Determine a and compute P(X$\le$ 1.5)

   (b) The average life of a bulb is 1000 hours and standard deviation is 300 hours. If X is the life period of a bulb which is distributed normally, find the probability that a randomly picked bulb will last
      i. less than 500 hours
      ii. more than 600 hours
      iii. between 700 and 800 hours. [8+8]

2. (a) write down the the law of transformation for the tensors
      i. A_i^{kj}
      ii. C_{mn}

   (b) Define Christoffel symbol of second kind. If $(ds)^2 = (dr)^2 + r^2(d\theta)^2 + r^2\sin^2\theta\,(d\varphi)^2$, then find the value of [1 ,22] and [3,13] [8+8]

3. (a) When n is a positive integer , Prove that $\frac{d}{dx}\left[x^n J_n\left(X\right)\right] = x^n\, J_{n-1}\left(X\right)$ Hence show that $J_{n-1}\left(X\right) = \frac{n}{x} J_n\left(X\right) + J'_{n(x)}$

   (b) Prove that $\frac{d}{dx}\left[x^n J_n\left(x\right)\right] = x^n J_{n-1}\left(x\right)$ Hence show that $J_{n-1}\left(x\right) = \frac{n}{x} J_n\left(x\right) - J'_{n(x)}$. [8+8]

4. (a) Evaluate $\int\limits_c \frac{e^z dz}{(z^2+\pi^2)^2}$ where e is the circle $|z| = 4$ by using Cauchy's integral formula.

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   (b) Determine bilinear transformation which map the points z = 0, 1, ∞ into w = -5,-1, 3 Find the critical and fixed points of the transformation. [8+8]

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      iii. if f(z) $=\frac{z+4}{(z+3)(z-1)^2}$, find Laurent's series expansions in.

         A. $0 < |z-1| < 4$ and

         B. $|z-1| > 4$ [8+8]

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Code No: 07A4BS04 **R07** **Set No. 1**

II B.Tech II Semester Examinations,APRIL 2011
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

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2. (a) Evaluate $\int\limits_{c} \frac{e^z dz}{(z^2+\pi^2)^2}$ where e is the circle $|z| = 4$ by using Cauchy's integral formula.

   (b) Evaluate $\int_c \frac{z\,dz}{(z^2-6z+25)^2}$ where C is $|z-(3+4i)| = 9$ using Cauchys integral formula. [8+8]

3. (a) Let X be a continuous random variable with probability function

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   Determine a and compute P(X≤ 1.5)

   (b) The average life of a bulb is 1000 hours and standard deviation is 300 hours. If X is the life period of a bulb which is distributed normally, find the probability that a randomly picked bulb will last
   i. less than 500 hours
   ii. more than 600 hours
   iii. between 700 and 800 hours. [8+8]

4. (a) Find all values of K such that f(z) = e^x (cos $ky + i$ sin $k\,y$) is analytic

   (b) Find the analytic function whose real part is $\frac{x}{x^2+y^2}$

   (c) Find all the roots of the equation cos z = 2. [5+5+6]

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   (b) Prove that $\frac{d}{dx}\left[x^n J_n(x)\right] = x^n J_{n-1}(x)$ Hence show that $J_{n-1}(x) = \frac{n}{x} J_n(x) - J'_{n(x)}$. [8+8]

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Code No: 07A4BS04 **R07** **Set No. 3**

II B.Tech II Semester Examinations,APRIL 2011
MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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   i. $\mathrm{A}_{\mathrm{i}}^{\mathrm{kj}}$
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