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

4. (a) Evaluate $\int_c \frac{e^z dz}{(z^2+\pi^2)^2}$ 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 =π 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. 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]

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

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MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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

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

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 $\frac{d}{dx}[x^n J_n(X)] = x^n J_{n-1}(X)$ Hence show that $J_{n-1}(X) = \frac{n}{x}J_n(X) + J'_{n(x)}$

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

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

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(b) 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]

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

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

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3. (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
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   ii. more than 600 hours
   iii. between 700 and 800 hours. [8+8]

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

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MATHEMATICS FOR AEROSPACE ENGINEERS
Aeronautical Engineering

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   i. $\mathrm{A}_{\mathrm{i}}^{\mathrm{kj}}$
   ii. C_{mn}

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

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