Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY,BANGALORE

COURSE PLAN

Academic Year 2019-20

Program:	BS
Semester :	4
Course Code:	18MAT41
Course Title:	COMPLE ANALYI,PROBABILITY&TATITICAL METHODS
Credit / L-T-P:	3 / 2:2:0
Total Contact Hours:	50
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Note : Remove “Table of Content” before including in CP Book
Each Course Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	ME/CV/ECE/CSE/ISE/EEE
Year / Semester :	IV	Academic Year:	2019-20
Course Title:	Complex Analysis, Probability And Statistical Methods	Course Code:	18MAT41
Credit / L-T-P:	3/ 2:2:0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	60 Marks
CIA Marks:	40	Assignment	1 / Module
Course Plan Author:	PUJITHA G	Sign	Dt: 10-02-2020
Checked By:		Sign	Dt:

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	Complex Variables: Review of a function of a complex variable, limits, continuity, differentiability. Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties and construction of analytic functions.	10	Analytic functions	L3
2	Conformal transformations, discussion of transformations W= (z^2) W= e^z and bilinear transformations-problems.Complex line integrals-Cauchy's theorem andCauchy's integral formula, Residues.poles.Cauchy's Residue theorem (without proof) and problems.	10	Integrals and complex analysis	L4
3	Probability Distributions: Random variables (discrete and continuous), probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and normal distributions, problems.	10	Random variables	L3
4	curve fitting ,Statistical methods, lines of regression, correlation ,rank correlation.	10	Data analyzing	L3
5	Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient. Sampling Theory: Sampling, Sampling distributions, standard error, test of hypothesis for means and proportions, confidence limits for means, student's t-distribution, Chi-square distribution as a test of goodness of fit.	10	Discrete random variables. Sampling distribution in accepting or rejecting the hypothesis.	L3
-	**Total**	**50**	-	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1	B.S.Grewal: Higher Engineering Mathematics, Khanna publishers, 43rd Ed.,2015.		In Dept
2	E.Kreyszig: Advanced Engineering Mathematics,John Wiley & Sons, 10th Ed.(Reprint),2016.		In Dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**		
1	C Ray Wylie, Louis C Barrett: "Advanced Engineering Mathematics",6th Edition, 2.McGraw-Hill Book Co.,New york,1995.		Not Available
2	James Stewart:"Calculus- Early Transcendentals", Cengage Learning India Private Ltd.,2017.		Not Available
3	B.V.Ramana:"Higher Engineering Mathematics" 11th Edition Tata McGraw-Hill,2010.		In Dept
4	Srimanta Pal & Subobh C Bhunia: "Engineering Mathematics", Oxford UniversityPress, 3rd Reprint, 2016.	**-**	Not Available
5	Gupta C B, Singh S R and Mukesh Kumar:"Engineering Mathematics for SemesterI and II, Mc-Graw Hill Education(India)Pvt.Ltd., 2015.		Not Available
D	**Software Tools for Design**	**-**	**-**
E	**Recent Developments for Research**	**-**	**-**
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1	01. https://youtu.be/fOGaD2p-x3c 02. https://youtu.be/AvFs2zi3450 03. https://youtu.be/pB41_cA8zck 04. https://youtu.be/lskNRQdSWXo 05. https://youtu.be/EVPb2GWb-Rc 06. https://youtu.be/5WCDuGkj_Fw 07. https://youtu.be/XJYdcNiHHxo 08. https://youtu.be/6ZCWdyrRRKw 09. https://youtu.be/CFBYX-9ywlw		
2	1. https://nptel.ac.in/courses/111107056/		
3	1. https://nptel.ac.in/courses/111105041/ 2.https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105105045/lec7.pdf 3.https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/103106112/lec5.pdf		
4	https://www.youtube.com/watch?v=AzroLr1XS5E		
	https://www.youtube.com/watch?v=0WejW9MiTGg		
5	https://www.youtube.com/watch?v=LSIgQH06j74		
	https://www.youtube.com/watch?v=TvCzRW1hfUk		
G	**Web links and Video Lectures:**		
1			
2	VTU EDUSAT PROGRAMME - 20		

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	18MAT41	Complex analysis,probab	Calculus of complex function	M3	Knowledge of analytic functions.	L2

		ility&stastistial methods				
2	18MAT41	Complex analysis,probability&stastistial methods	Conformal transformation&complex integration	Lower standards(M3)	Knowledge of Integrals&complex Analysis.	L3
3	18MAT41	Complex analysis,probability&stastistial methods	probability	Lower standards	Knowledge of Random Variables	L2
4	18MAT41	Complex analysis,probability&stastistial methods	Curve fitting&staistical methods	Lower standards	Knowledge of Data Analyzing	L2
5	18MAT41	Complex analysis,probability&stastistial methods	Joint probability&sampling theory	M4	Knowledge of Dicrete Random Variables&sample Distributing in Accepting the Hypothesis	L3

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Calculus of complex function	HE		L4
2	Conformal transformation&complex integration	HE		L4
3	probability	HE		L6
4	Curve fitting&staistical methods	HE		L4
5	Joint probability&sampling theory	HE		L4
-				

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	18MAT41	Apply the knowledge of complex analysis its properties and construction of analytical functions.	10	Analytic functions	Lecture	Assignment and slip test	L3
2,4	18MAT41	Analyze various transformations to convert one plane to another evaluate complex integral and finding the bet relation between the variables.	10	Integrals and complex analysis	Lecture	Assignment and slip test	L3 &L4

3	18MAT41	Learn different probability measures ,distribution function and its properties and also apply various inequalities in statistical analysis.	10	Random variables, Discrete random variables &Statistical Methods,	Lecture	Assignment and slip test	L3
5	18MAT41	Solve the problem of statistical inference problems,of testing of hypothesis.	10	Sampling distribution in accepting or rejecting the hypothesis.	Lecture	Assignment and slip test	L3
-	-	**Total**	**50**	-	-	-	**L3-L4**

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	To study the nature of electromagnetic wave in conductors..	co1	L3
2	To study the nature of complex potential in field theory Curve fitting is the process of constructing a curve that has the best fit to a series of data points.	co2	L3&L4
3	To analyze problems associated with optimization of digital circuits	co3	L3
4	To solve problems related to information and coding theory&To smoothen and prediction of discrete data in digital computers & cruise control system in motor vehicles.	co4	L3

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Modules	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	-	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	-
1	CO1	PO1	3	Apply the knowledge of Complex Variables in finding the solution to complex engineering problems.	L3
1	CO1	PO2	3	Formulate engineering problems using first principles of Complex Variables .	L3
1	CO1	PO8	2	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	L3
1	CO1	PO9	3	Function effectively as an individual in multidisciplinary settings using Complex Variables .	L3
1	CO1	PO10	3	Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation make effective presentation and give and receive clear instructions.	L3
1	CO1	PO12	3	Recognize the need for life- long learning with practical applications in engineering field using Complex Variables .	L3
2,4	CO2	PO1	3	Apply the knowledge of Statistical methods in finding the solution to complex engineering problems.	L3&L4
2,4	CO2	PO2	3	Formulate and review engineering problems using first principles of Statistical methods.	L3&L4
2,4	CO2	PO3	2	Develop and Design solutions for complex engineering problems using Statistical methods	L3&L4
2,4	CO2	PO8	2	Apply ethical principles and commit to professional ethics and	L3&

				responsibilities and norms of the engineering practice.	L4
2,4	CO2	PO9	3	Function effectively as an individual in multidisciplinary settings using Statistical methods .	L3& L4
2,4	CO2	PO10	3	Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation make effective presentation and give and receive clear instructions.	L3& L4
2,4	CO2	PO12	3	Recognize the need for life- long learning with practical applications in engineering field using Statistical methods .	L3& L4
3	CO3	PO1	3	Apply the knowledge of Probability Distributions in finding the solution to complex engineering problems.	L3
3	CO3	PO2	2	Formulate engineering problems using first principles of Probability Distributions .	L3
3	CO3	PO8	3	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	L3
3	CO3	PO9	3	Function effectively as an individual in multidisciplinary settings using Probability Distributions .	L3
3	CO3	PO10	3	Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation make effective presentation and give and receive clear instructions.	L3
3	CO3	PO12	3	Recognize the need for life- long learning with practical applications in engineering field using Probability Distributions .	L3
5	CO4	PO1	3	Apply the knowledge of Sampling Theory in finding the solution to complex engineering problems.	L3
5	CO4	PO2	3	Formulate engineering problems using first principles of Sampling Theory	L3
5	CO4	PO8	3	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	L3
5	CO4	PO9	2	Function effectively as an individual in multidisciplinary settings using Sampling Theory .	L3
5	CO4	PO10	3	Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation make effective presentation and give and receive clear instructions.	L3
5	CO4	PO12	4	Recognize the need for life- long learning with practical applications in engineering field using Sampling Theory .	L3

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12				Level
1	18MAT41.1	Apply the knowledge of complex analysis its properties and construction of analytical functions.	2.5	2.5						2.5	2.5	2.5		2.5				L3
2,4	18MAT41.2	Analyze various transformations to convert one plane to another evaluate complex integral and finding the bet relation between the variables.	2.5	2.5	2.5					2.5	2.5	2.5		2.5				L3& L4
3	18MAT41.3	Learn different probability measures ,distribution function and its properties and also apply various inequalities in statistical analysis.	2.5	2.5						2.5	2.5	2.5		2.5				L3

5	18MAT41.4	Solve the problem of statistical inference problems,of testing of hypothesis.	2.5	2.5					2.5	2.5	2.5		2.5				L3
-	**CS501PC**	**Average attainment (1, 2, or 3)**																**-**
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Modules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Calculus of complex function	10	2	-	-			2	CO1	L3
2	Conformal transformation&complex integration	10	2	-	-			2	CO2	L4
3	probability	10	-	2	-			2	CO3	L3
4	Curve fitting&staistical methods	10	-	2	-			2	CO2	L3
5	Joint probability&sampling theory	10	-	-	4			2	CO5	L3
-	**Total**	**50**	**4**	**4**	**4**			**10**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	30	CO2,CO3,	L3,L3
3, 4	CIA Exam – 2	30	CO1,co4	L3 ,L3
5	CIA Exam – 3	30	CO2	L4
1, 2	Assignment - 1	10	CO2,CO3,	L3,L3

3, 4	Assignment - 2	10	CO1,co4	L3 ,L3
5	Assignment - 3	10	CO2	L4
1, 2	Seminar - 1		-	-
3, 4	Seminar - 2		-	-
5	Seminar - 3		-	-
1, 2	Quiz - 1		-	-
3, 4	Quiz - 2		-	-
5	Quiz - 3		-	-
1 - 5	Other Activities – Mini Project	-		
	Final CIA Marks	**20**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:	Calculu of complex functions:	Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	The student should be able to:	-	**Level**
1	Apply the knowledge of complex analysis its properties and construction of analytical functions	CO1	**L3**
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Complex Variables: Review of a function of a complex variable, limits, continuity, differentiability. Analytic functions-Cauchy-Riemann equations in cartesian and polar forms. Properties and construction of analytic functions	Co1	L3
2	Function of a complex variables	Co1	L3
3	Analytic functions problems& theorems	Co1	L3
4	Cauchy-Riemann equations in cartesian form	Co1	L3
5	Cauchy-Riemann equations in polar forms	Co1	L3
6	Harmonic property	Co1	L3
7	Cauchy' theorems	Co1	L3
8	Consequence of cauchy's theorem	Co1	L3
9	Construction of analytic function	Co1	L3
10	Milne thomon method problems	Co1	L3
c	Application area;		
1	To study the nature of electromagnetic wave in conductors..	co1	L3
d	REVIEW QUESTIONS:		
1	Derive the Cauchy Riemanns equation in the Cartesian form.	co1	L3
2	Derive Cauchy Riemann equations in Polar form. (OR) Derive the necessary conditions for $f(z)=u(r,\theta)+iv(r,\theta)$ to be analytic in a regio	co1	L3
3	Show that Z^n is analytic .Hence find its derivative	co1	L3
4	If $w=z^3$ find dw/dz.	co1	L3

5	If f(z)=u+iv is analytic and hence find f(z) if u-v =(x-y)($x^2+4xy+y^2$).	CO1	L3
6	Find the analytic function u+iv where u is given to be u=e^x((x^2-y^2)cosy-2xysiny)	CO1	L3
7	If f(z)=u+iv is analytic prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial x^2}\right)\lvert f(z)\rvert^2=4\lvert f^I(z)\rvert^2$	CO1	L3
8	If f(z)=u+iv is analytic function ,show that $\left[\frac{\partial}{\partial x}\lvert f(Z)\rvert\right]^2+\left[\frac{\partial}{\partial y}\lvert f(Z)\rvert\right]^2=\lvert f^I(Z)\rvert^2$.	CO1	L3
9	Find the analytic function f(z)=u+iv given that u=) $+\frac{x}{(x^2+y^2)}$.	CO1	L3
10	If $f(z)=u(r,\theta)+iv(r,\theta)$ is an analytic function, show that u and v satisfy yhe equation $\frac{\partial^2\phi}{\partial r^2}+\frac{1}{r}\frac{\partial\phi}{\partial r}+\frac{1}{r^2}\frac{\partial^2\phi}{\partial\theta^2}=0$	CO1	L3
11	Find the analytic function f(z)=u+iv whose real part is $y+e^x cosy$.	CO1	L3
e	**Experiences**		

Module – 2

Title:	Conformal tranformation & comple integration:	Appr Time:	7 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
	The student should be able to:	-	**Level**
1	Analyze various transformations to convert one plane to another evaluate complex integral and finding the bet relation between the variables.	CO2	L3 &L4
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Conformal transformation introduction	CO2	L3 &L4
2	Discussion of transformations:W=z^2	CO2	L3 &L4
3	Discussion of transformations:W=e^Z	CO2	L3 &L4
4	Discussion of transformations:W=Z+1/Z	CO2	L3 &L4
5	Bilinear transformation problems	CO2	L3 &L4
6	Complex integration introduction	CO2	L3 &L4
7	Line function integral of a complex	CO2	L3 &L4
8	cauchy's theorem	CO2	L3 &L4
9	cauchy's integral formmula	CO2	L3 &L4
10	Baed on problems	CO2	L3 &L4
c	**Application Areas**	**-**	**-**
1	To study the nature of complex potential in field theory Curve fitting is the process of constructing a curve that has the best fit to a series of data points.	CO2	L3&L4
d	**Review Questions**	-	-
-		-	-
1	Discussion of transformations:W=z^2	CO2	L4
2	Discussion of transformations:W=e^Z	CO2	L4
3	Discussion of transformations:W=Z+1/Z	CO2	L4
4	Find the bilinear transformation that maps the points z=-1,i,1 on to the points w=1,i,-1 respectively.	CO2	L3
5	Find the bilinear transformation that maps the points 1,i,-1 onto the points i,0,-1	CO2	L3

	respectively		
6	Find the bilinear transformation that transforms the points z1=1,z2=i,z3=-1 onto the points w1=2,w2=i,w3=-2 find the fixed points of the transformation.	CO2	L3
7	Line function , complex line integrals	CO2	L3
8	cauchy's theorem	CO2	L3
9	cauchy's integral formmula	CO2	L3
10	Baed on problems	CO2	L3
e	**Experiences**	-	-
1			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	18MAT31	Sem:	IV	Marks:	30	Time:	60 minutes		
Course:	Complex analysis,probability&stastistial methods								
-	-	Note: Answer all questions, each carry equal marks. Module : 1, 2					Marks	CO	Level
1	a	Derive the Cauchy Riemanns equation in the Cartesian form.					5	CO1	L3
	b	Derive Cauchy Riemann equations in Polar form. (OR) Derive the necessary conditions for f(z)=u(r,θ)+iv(r,θ) to be analytic in a region					5	CO1	L3
	C	Find the analytic function u+iv where u is given to be u=e^x((x^2-y^2)cosy-2xysiny)					5	CO1	L3
		OR							
2	a	Show that Z^n is analytic .Hence find its derivativeIf w=z^3 find dw/dz.					5	CO1	L3
	b	Find the analytic function f(z)=u+iv given that u=¿¿) + $\frac{x}{(x^2+y^2)}$.					5	CO1	L3
	C	Find the analytic function f(z)=u+iv whose real part is $y+e^x cosy$					5	CO1	L3
3	a	Discussion of transformations:W=z^2					5	CO2	L4
	b	cauchy's theorem					5	CO2	L3
	C	Find the bilinear transformation that maps the points 1,i,-1 onto the points i,0,-1 respectively					5	CO2	L3
		OR							
4	a	Discussion of transformations:W=Z+1/Z					5	CO2	L4
	b	cauchy's integral formmula					5	CO2	L3
	C	Find the bilinear transformation that transforms the points z1=1,z2=i,z3=-1 onto the points w1=2,w2=i,w3=-2 find the fixed points of the transformation.					5	CO2	L3

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions									
Crs Code:	18MAT41	Sem:	4	Marks:	5	Time:	90 – 120 minutes		
Course:	Complexanalysis,probability&stastistialmethods			Module : 1, 2					
Note: Each student to answe5r 2-3 assignments. Each assignment carries equal mark.									
SNo	USN	Assignment Description					Marks	CO	Level

1		Derive the Cauchy Riemanns equation in the Cartesian form.	5	CO1	L3
2		Derive Cauchy Riemann equations in Polar form. (OR) Derive the necessary conditions for f(z)=u(r,θ)+iv(r,θ) to be analytic in a regio	5	CO1	L3
3		Show that Z^n is analytic .Hence find its derivative	5	CO1	L3
4		If $w=z^3$ find dw/dz.	5	CO1	L3
5		If f(z)=u+iv is analytic and hence find f(z) if u-v =(x-y)($x^2+4xy+y^2$).	5	CO1	L3
6		Find the analytic function u+iv where u is given to be $u=e^x$((x^2-y^2)cosy-2xysiny)	5	CO1	
7		If f(z)=u+iv is analytic prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial x^2}\right)\|f(z)\|^2=4\|f^I(z)\|^2$	5	CO1	L3
8		If f(z)=u+iv is analytic function ,show that $\left[\frac{\partial}{\partial x}\|f(Z)\|\right]^2+\left[\frac{\partial}{\partial y}\|f(Z)\|\right]^2=\|f^I(Z)\|^2$.	5	CO1	L3
9		Find the analytic function f(z)=u+iv given that u=¿¿) + $\frac{x}{(x^2+y^2)}$.	5	CO1	L3
10		If $f(z)=u(r,\theta)+iv(r,\theta)$ is an analytic function, show that u and v satisfy yhe equation $\frac{\partial^2\phi}{\partial r^2}+\frac{1}{r}\frac{\partial\phi}{\partial r}+\frac{1}{r^2}\frac{\partial^2\phi}{\partial\theta^2}=0$	5	CO1	L3
11		Find the analytic function f(z)=u+iv whose real part is $y+e^x cosy$.	5	CO1	L3
12		Discussion of transformations:W=z^2	5	CO2	L4
13		Discussion of transformations:W=e^Z	5	CO2	L4
14		Discussion of transformations:W=Z+1/Z	5	CO2	L4
15		Find the bilinear transformation that maps the points z=-1,i,1 on to the points w=1,i,-1 respectively.	5	CO2	L4
16		Find the bilinear transformation that maps the points 1,i,-1 onto the points i,0,-1 respectively	5	CO2	L4
17		Find the bilinear transformation that transforms the points z1=1,z2=i,z3=-1 onto the points w1=2,w2=i,w3=-2 find the fixed points of the transformation.	5	CO2	L4
18		Line function , complex line integrals	5	CO2	L4
19		cauchy's theorem	5	CO2	L4
20		cauchy's integral formmula	5	CO2	L4
21		Baed on problems	5	CO2	L4
22		P.T w=1+z/1-z map the region |z| less than are equal to 1 onto the half plane R(U) greaterthan are equal to 0 being the region ugreater than are equal to 0	5	CO2	L4
23		Find the invariant points of the following bilinear transformations w=z-1-i/z+2	5	CO2	L4
24		Bilinear transformationw=3z-4/z-1	5	CO2	L4
25		Obtain the image of the region bounded by the line x=1,x=2,y=1,y=2 under the tranformation w=e^z and sketch the	5	CO2	L4

		region			

D2. TEACHING PLAN - 2

Module – 3

Title:	PROBABILITY DISTRIBUTIONS:	Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	The student should be able to:	-	**Level**
1	Learn different probability measures ,distribution function and its properties and also apply various inequalities in statistical analysis.	CO3	
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Probability distributions: Introduction on probability some examples	CO3	L3
2	Random variables(discrete and continuous)	CO3	L3
3	probability mass/density function	CO3	L3
4	Binomial distribution based on problems	CO3	L3
5	poisson distribution based on problems	CO3	L3
6	Exponential ditribution and problems normal	CO3	L3
7	normal distribution& problems.	CO3	L3
8	More examples on dirtibutions	CO3	L3
c	**Application Areas**	**-**	**-**
-		-	-
1	To analyze problems associated with optimization of digital circuits	co3	L3
d	**Review Questions**	-	-
-		-	-
1	**Find the binomial probability distribution which has mean 2 and variance 4/3**		
2	Fit a poiSSon distribution for the following data and calculate the theoretical frequency X:0 1 2 3 4 Y:122 60 15 2 1		
3	The number of telephone lines busy at an instant of time is binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that i) No line is busy ii) At least 5 lines are busy iii) At most 3 lines are busy.	CO3	L3
4	The probability that a man aged 60 will live up to 70 is 0.65. Out of 10 men, now at the age of 60 ,find probability that 1)Atlest 7 will live up) 2)Exactly 9 will live up to 7	CO3	L3
5	The probability that a man aged 60 will live up to 70 is 0.65. Out of 10 men, now at the age of 60 ,find probability that 1)Atlest 7 will live up) 2)Exactly 9 will live up to 7	CO3	L3
6	In sampling a large number of parts manufactured by a company , the mean number of defectives in a samples of 20 is 2. Out of 1000 such	CO3	L3

	samples , how many would be expected to contain atleast three defective parts		
7	Given that 2% of the fuses manufactured by a firm are defective ,find by using Poisson distribution ,the probability that a box containing 200 fuses has i)No defective fuses ii)3 or more defective fuses iii)At least one defective fuse.	CO3	L3
8	For the following normal distribution find c and also the mean and S.D of frequency distribution	CO3	L3
9	In normal distribution 31% of the items are under 45 and 8% are over 64 .Find the mean and standard deviation given that A(0.5)-0.19 And A(1.4)=0.42	CO3	L3
10	i) A die is thrown 8times. Find the probability that '3' falls ii) Exactly 2 times iii) At least once At the most 7times	CO3	L3
11	In certain town the duration of shower has mean 5 minutes. What is the probability that shower will last for i) 10 minutes or more ii) less than 10 minutes iii) between 10 and 12 minutes	CO3	L3
12	If x I a normal variate with mean 30 and S.D 5 find the probability that (1) 26 less than are equal to"" X'"Less than are equal to40 (2) X greater than are equal to 45.	CO3	L3
e	**Experiences**	-	-
1			
2			

Module – 4

Title	Curve fitting & statistical methods	Appr Time:	13 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	Student should be able to		**LEVEL**
1	Analyze various transformations to convert one plane to another evaluate complex integral and finding the bet relation between the variables.& Apply to construct numerical data and solving by least square method	co2	**L3**
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Correlation and rank correlation problems	co2	L3
2	More examples on rank correlation		
3	Regression and Regression coefficients	co2	L3
4	lines of regression - problems	co2	L3
5	Regression line XON Y &Y ON X problems	co2	L3
6	Fitting of curves introduction- Fitting equation of straight line.	co2	L3
7	Fitting equation of parabola.	co2	L3
8	Second degree parabola problems	co2	L3
9	Fitting equation of exponential curve problems	co2	L3
10	More examples	co2	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-

1	To study the nature of complex potential in field theory Curve fitting is the process of constructing a curve that has the best fit to a series of data points.	co2	L3
d	**Review Questions**	-	-
-			
1	Fit a curve of the form $y=ae^{bx}$ to the following data : x : 77 100 185 239 285 y : 2.4 3.4 7.0 11.1 19.6	CO2	L3
2	Fit a parabola by using least squares method to the following method to the following data : x : 1.0 1.5 2.0 2.5 3.0 3.5 4.0 y : 1.1 1.3 1.6 2.0 2.7 3.4 4.1	CO2	L3
3	Fit a traight line y=ax+b for the following data x:1 3 4 6 8 9 11 14 Y:1 2 4 4 5 7 8 9	CO2	L3
4	Fit a straight line in the leat quare ence for the following data X:50 70 100 120 Y:12 15 21 25	CO2	L3
5	Fit a second degree parabola y=ax^2 +bx+c in the leat square sence for the following data X:1 2 3 4 5 Y:10 12 13 16 19	CO2	L3
6	Fit a curve of the form y=ae^bx for the data X: 0 2 4 Y:8.12 12 31.82	CO2	L3
7	Compute the coefficient of correlation and the equation of the lines of regression for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	CO2	L3
8	Obtain the line of regresion andf hence find the coefficient of correlation for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	CO2	L3
9	Find the correlation coefficient for the data A:92 89 87 86 83 77 71 63 53 50 Y:86 83 91 77 68 85 52 82 37 57	CO2	L3
10	Compute the rank correlation coefficient for the followingdata x:68 64 75 50 64 80 75 40 55 64 y:62 58 68 45 81 60 68 48 50 70	CO2	L3

e	**Experiences**	-	-
1			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	18MAT41	Sem:	IV	Marks:	30	Time:	75 minutes		
Course:	Complexanalysis,probability&stastistialmethods								
-	**-**	**Note: Answer all questions, each carry equal marks. Module : 3, 4**					**Marks**	**CO**	**Level**
1	a	**Find the binomial probability distribution which has mean 2 and variance 4/3**					5	CO3	L3
	b	Fit a poion distribution for the following data and calculate the theoretical frequency X:0 1 2 3 4 Y:122 60 15 2 1					5	CO3	L3
	C	The number of telephone lines busy at an instant of time is binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that i) No line is busy ii) At least 5 lines are busy iii) At most 3 lines are busy.							L3
							5	CO3	L3
		OR							
2	a	Given that 2% of the fuses manufactured by a firm are defective ,find by using Poisson distribution ,the probability that a box containing 200 fuses has i)No defective fuses ii)3 or more defective fuses iii)At least one defective fuse.					5	CO3	L3
	b	Obtain the mean and S.D of the normal distribution.					5	CO3	L3
	c	In a normal ditribution 31% of the itemes are under 45 and 8% of the item are over 64.find the mean and S.D of the distributions					5	CO3	L3
3	a	Fit a parabola by using least squares method to the following method to the following data : x : 1.0 1.5 2.0 2.5 3.0 3.5 4.0 y : 1.1 1.3 1.6 2.0 2.7 3.4 4.1					5	CO2	L3
	b	Fit a traight line y=ax+b for the following data x:1 3 4 6 8 9 11 14 Y:1 2 4 4 5 7 8 9					5	CO2	L3
	c	Fit a curve of the form y=ae^bx for the data X: 0 2 4 Y:8.12 12 31.82					5	CO2	L3
		OR							
4	a	Find the correlation coefficient for the data A:92 89 87 86 83 77 71 63 53 50 Y:86 83 91 77 68 85 52 82 37 57					CO2	L3	L3

	b	Compute the rank correlation coefficient for the followingdata x:68 64 75 50 64 80 75 40 55 64 y:62 58 68 45 81 60 68 48 50 70	CO2	L3	L3
	c	Obtain the line of regresion andf hence find the coefficient of correlation for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	CO2	L3	L3

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	18MAT41	Sem:	IV	Marks:	10	Time:	
Course:	Complexanalysis,probability&stastistialmethods			Module : 3, 4			

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1		The pdf of a variate x is given by the following table: X: 0	1	2	3 P(x): k	3k	5k	7k For what value of k this represents a valid probability distribution?	5	CO3	L3
2		Fit a poiSSon distribution for the following data and calculate the theoretical frequency X:0 1 2 3 4 Y:122 60 15 2 1	5	CO3	L3
3		When a coin is tossed 4 time find the probability of gettinh 1) exactly one head 2)atmot 3 head 3) at mot 2 heads	5	CO3	L3
4		The number of telephone lines busy at an instant of time is binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that i) No line is busy ii) At least 5 lines are busy iii) At most 3 lines are busy.	5	CO3	L3
5		Given that 2% of the fuses manufactured by a firm are defective ,find by using Poisson distribution ,the probability that a box containing 200 fuses has i)No defective fuses ii)3 or more defective fuses iii)At least one defective fuse.	5	CO3	L3
6		The probability that a man aged 60 will live up to 70 is 0.65. Out of 10 men, now at the age of 60 ,find probability that 1)Atlest 7 will live up) 2)Exactly 9 will live up to 7	CO3	L3	L3
7		In sampling a large number of parts manufactured by a company , the mean number of defectives in a samples of 20 is 2. Out of 1000 such samples , how many would be expected to contain atleast three defective parts	CO3	L3	L3
8		5In normal distribution 31% of the items are under 45 and	5	CO3	L3

		8% are over 64 .Find the mean and standard deviation given that A(0.5)-0.19 And A(1.4)=0.42			
9		1. A die is thrown 8times. Find the probability that '3' falls 2. Exactly 2 times 3. At least once At the most 7times	5	CO3	L3
10		In certain town the duration of shower has mean 5 minutes. What is the probability that shower will last for i) 10 minutes or more ii) less than 10 minutes iii) between 10 and 12 minutes	5	CO3	L3
11		The probability that a pen manufactured by a company will be defective is 0.1. if 12 such pens are selected , find the probability that i) exactly 2 will be defective ii) at least 2 will be defective iii) none will be defective.	5	CO3	L3
12		In a normal ditribution 31% of the itemes are under 45 and 8% of the item are over 64.find the mean and S.D of the distributions	5	co3	L3
13		If x I a normal variate with mean 30 and S.D 5 find the probability that (1) 26 less than are equal to"" X'"Less than are equal to40 (2) X greater than are equal to 45.	5	co3	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	Joint probability distribution & sampling theory	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	The student should be able to:	-	**Level**
1	To solve problems related to information and coding theory&To smoothen and prediction of discrete data in digital computers & cruise control system in motor vehicles.	co4	L3
			L3
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Introduction on joint probability distribution	co4	L3
2	joint probability distribution for two discrete random variables	co4	L3
3	Problems based on expectations	co4	L3
4	Problems on co variance	co4	L3
5	Sampling theory: Introduction to sampling distributions,	co4	L3
6	standard error,,test of hypothesis for means	co4	L3
7	Type 1&Type 2 errors	co4	L3
8	Confidence limits for means students's t-distribution	co4	L3
9	Chi-square distribution as a test of goodness of fit	co4	L3
10	More examples on sampling theory	co4	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-

1	Solve the problem of statistical inference problems,of testing of hypothesis.	CO4	L3
d	**Review Questions**	-	-
-			
1	The mean of a certain normal infinite population is equal to the standard error of the distribution of means of a sample of size 100 drawn from that population.find the probability that the mean of a sample of size 25 drawn from the population will be negative	CO4	L3
2	If the mean of an infinite population is 575 with standard deviation8.3,how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 572?	CO4	L3
3	Find the probability that in 100 tosses of a fair coin between 45% and 55% of the outcomes are heads	CO4	L3
4	Out of 1000 samples of 200 children each in how many would you expect to find that 1)iess than 40%are boys,2)between40%and 60% are boys,3)55%or more are girls	CO4	L3
5	A random sample of 400 items chosen from an infinite population is found to have a mean of 82 and a standard deviation of 18.find the 95% confidence limits for the mean of the population from which the sample is drawn	CO4	L3
6	The mean and standard deviation of marks scored by a sample of 100 students are 67.45 and 2.92 find 1)95% 2)99% confidence intervals for estimating the mean marks of the student population	CO4	L3
7	A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	CO4	L3
8	A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	CO4	L3
9	A coin was tossed 400 times and the head turned up 216 times test the hypothesis that the coin is unbiased at 5% level of significance./	CO4	L3
10	Find how many heads in 64 tosses of a coin will ensure its fairness at 0.05 level of significance.	CO4	L3
11	F or a random sample of 16 values with mean 41.5 and the sum of the squares of the deviations from the mean equal to 135 and drawn from a normal population,find the 95% confidence limits and the confidence interval,for the mean of the mean of the population.	CO4	L3
12	Find the students 't' for the following values in a sample of eight:-4,-2,-2,0,2,2,3,3, taking the mean of the population to be zero	CO4	L3
13	In 200 tosses of a coin,118 heads and 82 tails were observed test the hypothesis that the coin is fair at 0.05 and 0.01 levels of significance	CO4	L3
14	A die is thrown 60 times and the frequency distribution for the number appearing on the face x is given by the following table	CO4	L3
	X:1 2 3 4 5 6		
	f:15 6 4 7 11 17 test the hypothesis that the die is unbiased		
16	The joint distribution of two random variables X & Y is as follows X\Y | -4 | 2 | 7 1 | 1\8 | 1\4 | 1\8 5 | 1\4 | 1\8 | 1\8 1) E(X) AND E(Y) 2)E(Xy) 3) sigma x &sigma y 4) cov(x ,y) p(x,y)		
17	X\Y | -2 | -1 | 4 | 5 1 | 0.1 | 0.2 | 0 | 0.3		

	2	0.2	0.1	0.1	0		
	Determine the marginal probability distribution of x&y **1)E(X) &E(Y)** **2) S.D OF X&Y** **3)COV(X&Y)** **4) CORRELATION OF X AND Y**					-	-
e	**Experiences**					-	
1							

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	18mat41	Sem:	IV	Marks:	30	Time:	75 minutes
Course:	Complexanalysis,probability&stastistialmethods						

-	-	Note: Answer all questions, each carry equal marks. Module : 5	Marks	CO	Level
1	a	The mean of a certain normal infinite population is equal to the standard error of the distribution of means of a sample of size 100 drawn from that population.find the probability that the mean of a sample of size 25 drawn from the population will be negative	5	CO4	L3
	b	The joint distribution of two random variables X & Y is as follows X\Y | -4 | 2 | 7 1 | 1\8 | 1\4 | 1\8 5 | 1\4 | 1\8 | 1\8 1) E(X) AND E(Y) 2)E(Xy) 3) sigma x &sigma y 4) cov(x ,y) p(x,y)	5	CO4	L3
	c	A normal population has a mean 0.1 and a standard deviation 2.1 find the probability that the mean of a sample of 900 members will be negative	5	CO4	L3
		OR			
2	a	The mean and standard deviation of marks scored by a sample of 100 students are 67.45 and 2.92 find 1)95% 2)99% confidence intervals for estimating the mean marks of the student populatio	5	CO4	L3
	b	X\Y | -2 | -1 | 4 | 5 1 | 0.1 | 0.2 | 0 | 0.3 2 | 0.2 | 0.1 | 0.1 | 0 Determine the marginal probability distribution of X ,Y 1. Also find E(X),E(Y) AND E(XY) 2. S.D of X,Y 3. COV(X,Y) 4. Correlation of X AND Y 5. Further verify that X &Y are dependent random variables.		co4	L3
	c	A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	5	CO4	L3

3	a	A population consists of 4 numbers 3,7,11,15 1 Find the mean and S.D of the sampling distribution of mean by considering sampling of size 2 with replacement	5	CO4	L3
	b	The weights of 1500 ball bearings are normally distributed with a mean of 635 gms and S.D of 1.36 gms if 300 random samples of size 36 are drawn from this population determine the expected mean and S.D of the sampling distribution of mean if sampling I done 1) with replacement 2)without replacement	5	CO4	L3
	c	A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory conformed to specification an examination of a ample of 200 pieces of equipment revealed that 18 of them were faulty.tet hi claim at a significancelevel of 1% and 5%	5	CO4	L3
		OR			
4	a	Find the students 't' for the following values in a sample of eight:-4,-2,-2,0,2,2,3,3, taking the mean of the population to be zero	5	CO4	L3
	b	Find the students 't' for the following values in a sample of eight 3 2 ,0,2 1 1 2 3, taking the mean of the population to be zero.	5	CO4	L3
	c	A die is thrown 60 times and the frequency distribution for the number appearing on the face x is given by the following table: 1. X:1 2 3 4 5 6 2. Frequency:15 6 4 7 11 17 test the hypothesis that the die is unbiased	5	CO4	L3

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	18mat41	Sem:	IV	Marks:	10	Time:	90 – 120 minutes
Course:	Complexanalysis,probability&stastistialmethods			Module : 5			
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1		If the mean of an infinite population is 575 with standard deviation8.3,how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 572?	5	CO4	L3
2		Find the probability that in 100 tosses of a fair coin between 45% and 55% of the outcomes are heads	5	CO4	L3
3		Out of 1000 samples of 200 children each in how many would you expect to find that 1)iess than 40%are boys,2)between40%and 60% are boys,3)55%or more are girls	5	CO4	L3
4		A random sample of 400 items chosen from an infinite population is found to have a mean of 82 and a standard deviation of 18.find the 95% confidence limits for the mean of the population from which the sample is drawn	5	CO4	L3
5		A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	5	CO4	L3
6		The S.D of the life-times of television tubes manufactured by a company is estimated as 100 hours. Find how large a sample must be taken in order to be 99% confident that the error in the estimated mean life-time will not exceed 20 hours	5	CO4	L3
7		The S.D of the life-times of television tubes manufactured by a company is estimated as 100 hours. Find how large a sample must be taken in order to be 99% confident that the error in the estimated mean life-time will not exceed 20 hours	5	CO4	L3
8		Find the students 't' for the following values in a sample of	5	CO4	L3

<table>
<tr><td></td><td></td><td>eight:-4,-2,-2,0,2,2,3,3, taking the mean of the population to be zero</td><td></td><td></td><td></td></tr>
<tr><td>9</td><td></td><td>In 200 tosses of a coin,118 heads and 82 tails were observed test the hypothesis that the coin is fair at 0.05 and 0.01 levels of significance</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>10</td><td></td><td>Find how many heads in 64 tosses of a coin will ensure its fairness at 0.05 level of significance.</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>11</td><td></td><td>In 200 tosses of a coin,118 heads and 82 tails were observed test the hypothesis that the coin is fair at 0.05 and 0.01 levels of significance</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>12</td><td></td><td>Consider the markov chain of ball throwing pattern described in example show that in the long run,A will throw the ball 20 percent of the time,and b and c will throw the ball 40 percent of the time.</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>13</td><td></td><td>A population consists of 4 numbers 3,7,11,15
1 Find the mean and S.D of the sampling distribution of mean by considering sampling of size 2 with replacement</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>14</td><td></td><td>The weights of 1500 ball bearings are normally distributed with a mean of 635 gms and S.D of 1.36 gms if 300 random samples of size 36 are drawn from this population determine the expected mean and S.D of the sampling distribution of mean if sampling I done
1) with replacement
2)without replacement</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>15</td><td></td><td><table><tr><td>X\Y</td><td>-2</td><td>-1</td><td>4</td><td>5</td></tr><tr><td>1</td><td>0.1</td><td>0.2</td><td>0</td><td>0.3</td></tr><tr><td>2</td><td>0.2</td><td>0.1</td><td>0.1</td><td>0</td></tr></table>Determine the marginal probability distribution of X ,Y
6. Also find E(X),E(Y) AND E(XY)
7. S.D of X,Y
8. COV(X,Y)
9. Correlation of X AND Y
10. Further verify that X &Y are dependent random variables.</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>16</td><td></td><td>A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>17</td><td></td><td>The joint distribution of two random variables X & Y is as follows
<table><tr><td>X\Y</td><td>-4</td><td>2</td><td>7</td></tr><tr><td>1</td><td>1\8</td><td>1\4</td><td>1\8</td></tr><tr><td>5</td><td>1\4</td><td>1\8</td><td>1\8</td></tr></table>1) E(X) AND E(Y) 2)E(Xy)
3) sigma x &sigma y
4) cov(x ,y)
correlations (x,y)</td><td>5</td><td>CO4</td><td>L3</td></tr>
<tr><td>18</td><td></td><td>A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory conformed to specification an examination of a ample of 200 pieces of equipment revealed that 18 of them were faulty.tet hi claim at a significancelevel of 1% and 5%</td><td></td><td></td><td></td></tr>
</table>

F. EXAM PREPARATION

1. University Model Question Paper

Course:		Complexanalysis,probability&stastistialmethods					Month / Year		2020-04-01	
Crs Code:		18MAT41	Sem:	VII	Marks:	80	Time:		180 minutes	
Module	Note	Answer all FIVE full questions. All questions carry equal marks.						Marks	CO	Level
1	a	Derive the Cauchy Riemanns equation in the Cartesian form.						5	CO1	L3
	b	Derive Cauchy Riemann equations in Polar form. (OR) Derive the necessary conditions for f(z)=u(r,θ)+iv(r,θ) to be analytic in a regio						5	CO1	L3
	c	If f(z)=u+iv is analytic and hence find f(z) if u-v =(x-y)($x^2+4xy+y^2$).						5	CO1	L3
		OR								
1	a	Find the analytic function u+iv where u is given to be u=e^x((x^2-y^2)cosy-2xysiny)						5	CO1	L3
	b	If f(z)=u+iv is analytic function ,show that $\left[\frac{\partial}{\partial x}\lvert f(z)\rvert\right]^2+\left[\frac{\partial}{\partial y}\lvert f(z)\rvert\right]^2=\lvert f^I(z)\rvert^2$.						5	CO1	L3
	c	Find the analytic function f(z)=u+iv whose real part is $y+e^x cosy$						5	CO1	L3
		Find the analytic function f(z)=u+iv given that u=¿¿) +$\frac{x}{(x^2+y^2)}$.								
2	a	Discussion of transformations:W=z^2						5	co2	L4
	b	Find the bilinear transformation that maps the points z=-1,i,1 on to the points w=1,i,-1 respectively.						5	co2	L4
	c	cauchy's theorem						5	co2	L4
		OR								
2	a	cauchy's integral formula						5	co2	L3
	b	Find the bilinear transformation that transforms the points z1=1,z2=i,z3=-1 onto the points w1=2,w2=i,w3=-2 find the fixed points of the transformation.						5	co2	L3
	c	Discussion of transformations:W=Z+1/Z						5	CO2	L4
3	a	**Find the binomial probability distribution which has mean 2 and variance 4/3**						5	CO3	L3
	b	Fit a poiSSon distribution for the following data and calculate the theoretical frequency X:0 1 2 3 4 Y:122 60 15 2 1						5	CO3	L3
	C	The probability that a man aged 60 will live up to 70 is 0.65. Out of 10 men, now at the age of 60 ,find probability that 1)Atlest 7 will live up) 2)Exactly 9 will live up to 7						5	co3	L3
		OR								
3	a	The number of telephone lines busy at an instant of time is binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at						5	CO3	L3

		random, what is the probability that i) No line is busy ii) At least 5 lines are busy iii) At most 3 lines are busy.			
	b	Given that 2% of the fuses manufactured by a firm are defective ,find by using Poisson distribution ,the probability that a box containing 200 fuses has i)No defective fuses ii)3 or more defective fuses iii)At least one defective fuse.	5	CO3	L3
	c	For the following normal distribution find c and also the mean and S.D of frequency distribution	5	CO4	L3
	D	In normal distribution 31% of the items are under 45 and 8% are over 64 .Find the mean and standard deviation given that A(0.5)-0.19 And A(1.4)=0.42	5	CO3	L3
4	a	Fit a curve of the form $y=ae^{bx}$ to the following data : x : 77 100 185 239 285 y : 2.4 3.4 7.0 11.1 19.6	5	CO2	L3
	b	Fit a parabola by using least squares method to the following method to the following data : x : 1.0 1.5 2.0 2.5 3.0 3.5 4.0 y : 1.1 1.3 1.6 2.0 2.7 3.4 4.1	5	CO2	L3
	c	Fit a traight line y=ax+b for the following data x:1 3 4 6 8 9 11 14 Y:1 2 4 4 5 7 8 9	5	CO2	L3
		OR5			
4	a	Obtain the line of regresion andf hence find the coefficient of correlation for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	5	CO2	L3
	b	Find the correlation coefficient for the data A:92 89 87 86 83 77 71 63 53 50 Y:86 83 91 77 68 85 52 82 37 57	5	CO2	L3
	c	Compute the rank correlation coefficient for the followingdata x:68 64 75 50 64 80 75 40 55 64 y:62 58 68 45 81 60 68 48 50 70	5	CO2	L3
5	a		5	CO4	L3

X\Y	-2	-1	4	5
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine the marginal probability distribution of X ,Y
Also find E(X),E(Y) AND E(XY)

		S.D of X,Y COV(X,Y) Correlation of X AND Y Further verify that X &Y are dependent random variables.			
	C	A coin was tossed 400 times and the head turned up 216 times test the hypothesis that the coin is unbiased at 5% level of significance./			
		OR			
5	a	F or a random sample of 16 values with mean 41.5 and the sum of the squares of the deviations from the mean equal to 135 and drawn from a normal population,find the 95% confidence limits and the confidence interval,for the mean of the mean of the population.	5	CO4	L3
	b	Find the students 't' for the following values in a sample of eight:-4,-2,-2,0,2,2,3,3, taking the mean of the population to be zero	5	CO4	L3
	C	The joint distribution of two random variables X & Y is as follows X\Y | -4 | 2 | 7 1 | 1\8 | 1\4 | 1\8 5 | 1\4 | 1\8 | 1\8 1) E(X) AND E(Y) 2)E(Xy) 3) sigma x &sigma y 4) cov(x ,y) correlations (x,y)	5	CO4	L3

2. SEE Important Questions

Course:		Complexanalysis,probability&stastistialmethods					Month / Year	2020-07-01	
Crs Code:		18MAT41	Sem:	4	Marks:	80	Time:	180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.					-	-	
Module	Qno.	Important Question					Marks	CO	Year
1	a	Derive the Cauchy Riemanns equation in the Cartesian form.					5	CO1	2014
	b	Derive Cauchy Riemann equations in Polar form					5	CO1	2015
	c	If $w=z^3$ find dw/dz.					5	CO1	2009
	d	Construct the analytic function whose real part is $e^x(xsiny+ycosy)$					5	CO1	2010
	e	If $f(z)=u(r,\theta)+iv(r,\theta)$ is an analytic function, show that u and v satisfy yhe equation $\frac{\partial^2\phi}{\partial r^2}+\frac{1}{r}\frac{\partial\phi}{\partial r}+\frac{1}{r^2}\frac{\partial^2\phi}{\partial\theta^2}=0$					5	CO1	2009
	f	Find the analytic function f(z)=u+iv whose real part is $y+e^x cosy$.					5	CO2	2007
							5	CO2	2017
2	a	Discussion of transformations:W=z^2					5	CO2	2009
	b	Discussion of transformations:W=e^Z					5	CO2	2011
	c	Discussion of transformations:W=Z+1/Z					5	CO2	2013
	d	Find the bilinear transformation that maps the points z=-1,i,1 on to the points w=1,i,-1 respectively.					5	CO2	2015
	e	Find the bilinear transformation that maps the points 1,i,-1 onto the points i,0,-1 respectively					5	CO2	2015
	f	cauchy's integral formmula					5	CO2	2017
	g	P.T w=1+z/1-z map the region |z| less than are equal to 1 onto the half plane R(U) greaterthan are equal to 0 being the region ugreater than are equal to 0					5	CO2	2017

3	a	The pdf of a variate x is given by the following table: X: 0 | 1 | 2 | 3 | 4 | 5 P(x): k | 3k | 5k | 7k | 9k | 11k For what value of k this represents a valid probability distribution?		CO3	2017
	b	Given that 2% of the fuses manufactured by a firm are defective ,find by using Poisson distribution ,the probability that a box containing 200 fuses has i)No defective fuses ii)3 or more defective fuses iii)At least one defective fuse.	5	CO3	2009
	c	In normal distribution 31% of the items are under 45 and 8% are over 64 .Find the mean and standard deviation given that A(0.5)-0.19 And A(1.4)=0.42	5	CO3	2011
	d	4. A die is thrown 8times. Find the probability that '3' falls 5. Exactly 2 times 6. At least once At the most 7times	5	CO3	2011
	e	pdf of a variate X is given by the following table: X: -2 | -1 | 0 | 1 | 2 P(X): 0.1 | K | 0.2 | 2k | 0.3 For what value of k this represents a valid probability distribution? Also find :i)p(x≥2) ii)p(-1<x≤2)		CO3	2018
	f	The number of telephone lines busy at an instant of time is binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that i) No line is busy ii) At least 5 lines are busy iii) At most 3 lines are busy.	5	CO3	2011
	g	Find the probability that in 100 tosses of a fair coin between 45% and 55% of the outcomes are heads	5	CO3	2017
	h	Out of 1000 samples of 200 children each in how many would you expect to find that 1)iess than 40%are boys,2)between40%and 60% are boys,3)55%or more are girls	5	CO3	2018
4	a	Fit a curve of the form $y=ae^{bx}$ to the following data : x : 77 100 185 239 285 y : 2.4 3.4 7.0 11.1 19.6	5	CO2	2016
	b	Fit a parabola by using least squares method to the following method to the following data : x : 1.0 1.5 2.0 2.5 3.0 3.5 4.0 y : 1.1 1.3 1.6 2.0 2.7 3.4 4.1	5	CO2	2017
	c	Fit a traight line y=ax+b for the following data x:1 3 4 6 8 9 11 14 Y:1 2 4 4 5 7 8 9	5	CO2	2016
	d	Fit a straight line in the leat quare ence for the following data X:50 70 100 120 Y:12 15 21 25	5	CO2	2007

	e	Fit a second degree parabola y=ax^2 +bx+c in the leat square sence for the following data X:1 2 3 4 5 Y:10 12 13 16 19	5	CO2	2009
	f	Fit a curve of the form y=ae^bx for the data X: 0 2 4 Y:8.12 12 31.82	5	CO2	2010
	g	Compute the coefficient of correlation and the equation of the lines of regression for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	5	CO2	2010
	h	Obtain the line of regresion andf hence find the coefficient of correlation for the data X:1 2 3 4 5 6 7 Y:9 8 10 12 11 13 14	5	CO2	2010
	i	Find the correlation coefficient for the data A:92 89 87 86 83 77 71 63 53 50 Y:86 83 91 77 68 85 52 82 37 57	5	CO2	2013
	j	Compute the rank correlation coefficient for the followingdata x:68 64 75 50 64 80 75 40 55 64 y:62 58 68 45 81 60 68 48 50 70	5	CO2	2005
5	a	If the mean of an infinite population is 575 with standard deviation8.3,how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 572?	5	CO4	2016
	b	Find the probability that in 100 tosses of a fair coin between 45% and 55% of the outcomes are heads	5	CO4	2015
	c	Out of 1000 samples of 200 children each in how many would you expect to find that 1)iess than 40%are boys,2)between40%and 60% are boys,3)55%or more are girls	5	CO4	2016
	d	A random sample of 400 items chosen from an infinite population is found to have a mean of 82 and a standard deviation of 18.find the 95% confidence limits for the mean of the population from which the sample is drawn	5	CO4	2009
	e	The mean and standard deviation of marks scored by a sample of 100 students are 67.45 and 2.92 find 1)95% 2)99% confidence intervals for estimating the mean marks of the student population	5	CO4	2008
	f	A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	5	CO4	2012
	g	A biased coin is tossed 500 times and head turns up 120 times .find the 95% confidence limits for the proportion of heads turning up in infinitely many tosses	5	CO4	2015
	h	A coin was tossed 400 times and the head turned up 216 times test the hypothesis that the coin is unbiased at 5% level of significance./	5	CO4	2018
	i	Find how many heads in 64 tosses of a coin will ensure its fairness at 0.05 level of significance.	5	CO4	2017
	j	F or a random sample of 16 values with mean 41.5 and the sum of the squares of the deviations from the mean equal to 135 and drawn from a normal population,find the 95% confidence limits and the confidence interval,for the mean of the mean of the population.	5	CO4	2015
	k	Find the students 't' for the following values in a sample of eight:-4,-2,-2,0,2,2,3,3, taking the mean of the population to be zero	5	CO4	2005

<table>
<tr><td></td><td>l</td><td>In 200 tosses of a coin,118 heads and 82 tails were observed test the hypothesis that the coin is fair at 0.05 and 0.01 levels of significance</td><td>5</td><td>CO4</td><td>2009</td></tr>
<tr><td></td><td>m</td><td>A die is thrown 60 times and the frequency distribution for the number appearing on the face x is given by the following table</td><td>5</td><td>CO4</td><td>2011</td></tr>
<tr><td></td><td>n</td><td>X:1 2 3 4 5 6</td><td>5</td><td>CO4</td><td>2015</td></tr>
<tr><td></td><td>o</td><td>f:15 6 4 7 11 17 test the hypothesis that the die is unbiased</td><td>5</td><td>CO4</td><td>2017</td></tr>
<tr><td></td><td>p</td><td>The joint distribution of two random variables X & Y is as follows
<table>
<tr><td>X\Y</td><td>-4</td><td>2</td><td>7</td></tr>
<tr><td>1</td><td>1\8</td><td>1\4</td><td>1\8</td></tr>
<tr><td>5</td><td>1\4</td><td>1\8</td><td>1\8</td></tr>
</table>
1) E(X) AND E(Y) 2)E(Xy)
3) sigma x &sigma y
4) cov(x ,y)
p(x,y)</td><td>5</td><td></td><td>2018</td></tr>
</table>

Course Outcome Computation

Academic Year:

Odd / Even semester

INTERNAL TEST	**T1**						**T2**						**T3**			
Course Outcome	**CO1**		**CO2**		**CO3**		**CO4**		**CO5**		**CO6**		**CO7**		**CO8**	
QUESTION NO	**Q1**	**LV**	**Q2**	**LV**	**Q3**	**LV**	**Q1**	**LV**	**Q2**	**LV**	**Q3**	**LV**	**Q1**	**LV**	**Q2**	**LV**
MAX MARKS																
USN-1																
USN-2																
USN-3																
USN-4																
USN-5																
USN-6																
Average CO Attainment																

LV Threshold : 3:>60%, 2:>=50% and <=60%, 1: <=49%
CO1 Computation :(2+2+2+3)/4 = 10/4=2.5

PO Computation

Program Outcome Weight of CO - PO	PO1		PO3		PO3		PO1		PO12		PO12		PO6		PO1	
Course Outcome	CO1		CO2		CO3		CO4		CO5		CO6		CO7		CO8	
Test/Quiz/Lab	T1						T2						T3			
QUESTION NO	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV	Q3	LV	Q1	LV	Q2	LV
MAX MARKS																
USN-1																
USN-2																
USN-3																
USN-4																
USN-5																
USN-6																
Average CO Attainment																