ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕವಿಶ್ವವಿದ್ಯಾಲಯ

ಎಬಿಯುಅಧಿನಿಯಮ೧೯೯೪ ರಅಡಿಯಲ್ಲಿಕರ್ನಾಟಕಸರ್ಕಾರದಿಂದಸ್ಥಾಪಿತವಾದರಾಜ್ಯವಿಶ್ವವಿದ್ಯಾಲಯ

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

State University of Government of Karnataka Established as per the VTU Act, 1994 "JnanaSangama" Belagavi-590018, Karnataka, India

Prof. B. E. Rangaswamy, Ph.D
REGISTRAR

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REF: VTU/BGM/Aca/BoS/2023/ 473.

DATE: 19 APR 2023

CIRCULAR

Subject: PG-CSE Board Mathematics Syllabus updated regarding...

Reference: Chairperson BoS in CSE for PG programs University dept. mail dated 18.04.2023.
Chairperson BoS in Basic Sciences and Humanity approval dated 19.04.2023

The syllabus of **Mathematical Foundation of Computer Science 22xxx11** which is common for all the post-graduate programs of Computer Science and Engineering stream, is updated and submitted by the chairperson BoS in CSE for PG programs of the university. For the benefit of the stakeholder, the syllabus is made available @ https://vtu.ac.in/en/pg-scheme-syllabus/#pg0

It is hereby requested that all Engineering college principals under the ambit of the university to notify everyone concerned.

Encl: updated syllabus, as previously noted

Sd/-
REGISTRAR

To,

The Principals of Engineering Colleges are under the ambit of the University.

Copt to,

1. The Hon'ble Vice Chancellor through a secretary to VC for kind information
2. The Registrar (Evaluation) Examination Section VTU, Belagavi
3. The Director(I/c), ITI SMU, VTU Belagavi for information and to make arrangements to upload the syllabus along with the circular on the VTU web portal.
4. The Special Officer, QPDS Examination section VTU Belagavi
5. Office Copy

REGISTRAR

CommontoallMtechprogramsin CSEboard

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Course Code	**22SCE11,22SCN11,22SCS11, 22SIT11,22SSE11,22SFC11, 22SNI11,22SAM11,22SDS11, 22SAD11,22SCR11,22SWT11, 22VSC11,22VSA11**	CIEMarks	50
TeachingHours/Week(L:P:SDA)	3:0:0	SEEMarks	50
TotalHoursofPedagogy	40	TotalMarks	100
Credits	03	ExamHours	03

CourseLearningobjectives:

- Abilitytoanalyzethe solution &examine its stabilityin operator theory.
- Abilitytooptimize&solvereallife problems.
- Abilityto solve imageprocessing&signal processingproblems

Module-1

VectorSpaces:Vectorspaces;subspacesLinearlyindependentanddependentvectorsBasisanddimension;coordinatevectors-Illustrativeexamples.Lineartransformations,Representationof transformationsbymatrices;(RBT Levels:L1 &L2) (Textbook:1)

Teaching-LearningProcess	Chalkandtalkmethod /PowerPointPresentation

Module-2

Orthogonality and least squares: Inner product, orthogonal sets, orthogonal projections, orthogonalbases.GramSchmidtorthogonalizationprocess.QRfactorizationsofamatrices,leastsquareproblems, applications to linear models (least square lines and least square fitting of other curves).(RBT Levels:L2& L3)(Textbook:1)

Teaching-LearningProcess	Chalk and talk method / PowerPoint Presentation

Module-3

Eigenvalues and Eigenvectors, orthogonal diagonalization, Singular value decomposition,applications to image processing and statistics, Principal Component Analysis, Differential Equations. (RBT Levels:L2& L3)(Textbook-1)

Teaching-Learning Process	Chalkandtalkmethod /PowerPointPresentation

Module-4

Sampling theory: testing of hypothesis by t-test, χ^2test, F-test., Analysis of Variance (ANOVA): one way classification.(RBT Levels:L2 and L3)(Textbook:3& Ref.book:6))

Teaching-Learning Process	Chalkandtalkmethod /PowerPointPresentation

Module-5

Fourier series and Transform: Fourier series, integrals and transforms and their properties. One dimensional Fourier transform, Convolution theorem, Parseval's Identity formula and problems Introduction to 2-dimensional Fourier transform. (RBT Levels:L1& L2)(Textbook:2)

Teaching-Learning Process	Chalkandtalkmethod /PowerPointPresentation

AssessmentDetails(bothCIEandSEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimumpassing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marksof SEE.A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to eachsubject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (ContinuousInternalEvaluation) andSEE(Semester EndExamination) takentogether.

ContinuousInternalEvaluation:

1. ThreeUnitTestseachof**20 Marks**
2. Twoassignmentseachof**20MarksoroneSkillDevelopmentActivityof40marks** toattaintheCOsandPOs

Thesumofthreetests,twoassignments/skillDevelopmentActivities,willbe**scaleddownto50marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcomedefinedfor the course.

SemesterEndExamination:

1. TheSEEquestionpaperwillbesetfor100marksandthemarksscoredwillbeproportionatelyreduced to50.
2. Thequestionpaper will havetenfullquestionscarryingequalmarks.
3. Eachfullquestionisfor20marks.Therewillbetwofullquestions(withamaximumoffoursub-questions)fromeach module.
4. Eachfullquestionwillhaveasub-questioncoveringallthetopicsunderamodule.
5. Thestudents will havetoanswerfive fullquestions,selectingonefullquestionfromeachmodule.

SuggestedLearningResources:

TextBooks

1. DavidC.Lay,StevenR.LayandJ.J.McDonald,"LinearAlgebraanditsApplications",PearsonEducationLtd, 5th Edition 2015.
2. Dr.B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd edition, 2012.
3. Probability, Statistics and Random Process T. Veerarajan Tata Mc-Graw Hill Co 3 rd Edition 2016

ReferencesBooks

4. I.N. Sneddon, Fourier Transform
5. Kreyzig, "AdvancedEngineeringMathematics".
6. R.E, Walpole, R.H.Myres, S.L.Myres and Keying Ye, "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson, 2012.

SkillDevelopmentActivitiesSuggested

- The students with the help of the course teacher can take up technical –activities which will enhance their skill orthe students should interact with industry (small, medium and large), understand their problems or foresee whatcan be undertaken for study in the form of research/testing/projects. and for creative and innovative methods tosolvethe identified problem.Thepreparedreportshall beevaluatedforCIEmarks.

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent willbeableto:

Sl.No.	Description	BloomsLevel
CO1	Understand vector spaces and related topics arising in magnification and rotation of images.	L1 & L2
CO2	Compute orthogonal and orthonormal basis vectors required to analyze image and signal Processing problems	L2& L3
CO3	Applythetechniqueofsingularvaluedecompositionfordatacompression,leastsquare approximationinsolvinginconsistentlinearsystems	L2 &L3
CO4	Understand probabilistic concepts required to test thehypothesis and take decision using Analysis of variance.	L2& L3
CO5	Understand one and two dimensional Fourier transform	L1 & L2

ProgramOutcomeofthiscourse

Sl.No.	Description	POs
1	Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals. and computerscience and business systems to the solution of complexengineeringandsocietalproblems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complexengineeringandbusinessproblemsreachingsubstantiatedconclusionsusingfirstprinciplesof mathematics,natural sciences,and engineeringsciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriateconsideration for the public health and safety, and the cultural, societal, and environmentalconsiderations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesisofthe informationtoprovidevalidconclusions.	PO4
5	Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,and modernengineeringandITtoolsincludingpredictionandmodelingtocomplexengineeringactivitieswithanunderstandingofthe limitations	PO5
6	Theengineerandsociety:Applyreasoninginformedbythecontextualknowledgetoassesssocietal, health,safety,legalandculturalissuesandtheconsequentresponsibilities relevanttotheprofessionalengineeringandbusinesspractices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineeringsolutions in business societal and environmental contexts, and demonstrate the knowledgeof,andneedfor sustainabledevelopment.	PO7
8	Ethics:Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilitiesandnormsofthe engineeringand businesspractices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leaderindiverse teams, andin multidisciplinarysettings.	PO9
10	Communication:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineering community and with society at large, such as, being able to comprehend andwrite effective reports and design documentation, make effective presentations, and giveand receive clear instructions.	PO10
11	Projectmanagementandfinance:Demonstrateknowledgeandunderstandingoftheengineering, business and management principles and apply these to one"s own work, as amemberandleaderinateam, tomanageprojectsandinmultidisciplinaryenvironments.	PO11
12	Life-onglearning:Recognizetheneedfor,andhavethepreparationandabilitytoengageinindependentand life-longlearninginthebroadestcontextoftechnologicalchange.	PO12

MappingofCOSandPOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		X										
CO2	X											
CO3		X										
CO4	X	X										