

**MINI MATHEMATICS TRAINING FOR UG
STATISTICS STUDENTS – 2019
(MTUSS – 2019)**

(Funded by National Board of Higher Mathematics)

2nd – 15th December, 2019

Organized by: Department of Mathematics & Statistics



Principal Dr. V. Narayana Rao, addressing the gathering



Speech by Dr. K. Naveen Kumar, Local Convenor, MTUSS



Prof. Sharad S. Sane, Chennai Mathematical Institute, Chennai addressing the participants



MTUSS Resource Persons with Participants



Talk by Prof. Venu Thangaraj, Retd. Prof., Ramanujam Institute of Advanced Studies in Mathematics, University of Madras, Chennai



Speech by Dr. V. S. Vaidyanathan, Dept. of Statistics, Ramanujam Schools of Mathematical Science, Pondicherry University, Pudicherry



Prof. Arindam Senu Gupta, Dept. of Statistics,
University of Calcutta, Kolkata



Release of MTUSS



Certificate distribution to the participants

గణితంతో విస్తృత ఉపాధి అవకాశాలు

గణితశాస్త్ర నిపుణుడు శారద్ సానె

వన్టాన్, డిసెంబరు 1: గణాంక శాస్త్రంపై పట్టు సాధించటం ద్వారా గణాంక శాస్త్ర నిపుణుల కొరత సమస్యను నేటి విద్యార్థులు అధిగమించాలని ముంబయి ఇండియన్ ఇన్స్టిట్యూట్ ఆఫ్ టెక్నాలజీ (ఐఐటి) గణిత శాస్త్ర నిపుణులు శారద్ సానె అన్నారు. నేషనల్ బోర్డు ఆఫ్ హయ్యర్ మెథమెటిక్స్ సౌజన్యంతో కొత్తపేటలోని కేబీఎస్ కళాశాల గణితశాస్త్రం విభాగం ఆధ్వర్యంలో ఏర్పాటు చేసిన 15 రోజుల మేథమెటిక్స్ ట్రైనింగ్ ఫర్ యూజీ స్టాటిస్టిక్స్ స్టూడెంట్స్-2019 కార్యక్రమాన్ని సోమవారం ప్రారంభించారు. ఈ సందర్భంగా జరిగిన ప్రారంభ సభకు ముఖ్య అతిథిగా హాజరైన శారద్ సానె మాట్లాడుతూ గణాంక శాస్త్ర నిపుణుల అవసరం సమాజానికి ఎంతో ఉండ న్నారు. గణితంలో పట్టు సాధించటం ద్వారా విస్తృతమైన ఉపాధి అవకాశాలు పొందవచ్చన్నారు. వర్క్ షాప్ బోర్డు ఆఫ్ హయ్యర్ మెథమెటిక్స్ కో-ఆర్డినేటర్, యూనివర్సిటీ ఆఫ్ కోల్కతా, గణితశాస్త్ర విభాగాధ్యక్షులు అరిందమ్ సేన్ గుప్తా మాట్లాడుతూ ఈ వర్క్ షాప్ కు దేశవ్యాప్తంగా వచ్చిన 680



మాట్లాడుతున్న గణితశాస్త్ర నిపుణుడు శారద్ సానె, హాజరైన విద్యార్థులు

దరఖాస్తుల్లో 45 మందిని ఎంపిక చేసి ఆహ్వానించా మన్నారు. కళాశాల సెక్రటరీ అండ్ కరస్పాండెంట్ పీశ్రీనివాస్ మాట్లాడు తూ ఇలాంటి వర్క్ షాపులు విద్యార్థులను గణితంలో మరింత సమర్థవంతంగా తీర్చిదిద్దేందుకు దోహదపడతా యన్నారు. కళాశాల ప్రెసిడెంట్ డాక్టర్ వి.నారాయణరావు, వైస్ ప్రెసిడెంట్ డాక్టర్ కె.నవీన్ కుమార్ మాట్లాడుతూ మధ్యదేశీ, మహారాష్ట్ర

తమిళనాడు, కర్ణాటక, కేరళ, పశ్చిమబెంగాల్, తెలంగాణతో పాటు ఆంధ్రప్రదేశ్ నుంచి మొత్తం 45 మంది విద్యార్థులు ఈ వర్క్ షాప్ కు హాజరవుతున్నారని వివరించారు. వర్క్ షాపులో ముఖ్య యూనివర్సిటీలకు చెందిన ప్రముఖులు హాజరవుతారని తెలిపారు. కార్యక్రమంలో ఐఐటి మద్రాసుకు చెందిన నిపుణులు ఎ.సింగ్, విభాగాధిపతి ఎం.వెంకటేశ్వరరావు పాల్గొన్నారు.



విద్యార్థులు గణాంక శాస్త్రంపై పట్టు సాధించాలి



మాట్లాడుతున్న శరద్ సానె

వన్టాన్, డిసెంబర్ 2 (ప్రభన్యూస్) :విద్యార్థులు గణాంక శాస్త్రంపై పట్టు సాధించటం ద్వారా గణాంక శాస్త్ర నిపుణుల కొరత సమస్య నేటి విద్యార్థులు అధిగమించాలని బొంబాయి ఇండి యన్ ఇన్స్టిట్యూట్ ఆఫ్ టెక్నాలజీ (ఐఐటి) గణిత శాస్త్ర నిపుణులు శారద్ సానె చెప్పారు. నేషనల్ బోర్డు ఆఫ్ హయ్యర్ మెథమెటిక్స్ సౌజన్యంతో పాతబస్టిలోని కేబీయస్ కళాశాల గణిత శాస్త్ర విభాగం ఆధ్వర్యంలో ఏర్పాటు

చేసిన 15 రోజుల మేథమెటిక్స్ ట్రైనింగ్ ఫర్ యూజీ స్టాటిస్టిక్స్ స్టూడెంట్స్-2019 కార్యక్రమాన్ని సోమవారం ప్రారంభిం చారు. ఈ సందర్భంగా జరిగిన ప్రారంభ సభకు ముఖ్యఅతిథిగా విచ్చేసిన శరద్ సానె మాట్లాడుతూ 40 సంవత్సరాల క్రితం గణిత, గణాంక శాస్త్ర నిపుణుల అవసరం సమాజానికి ఎంతో ఉండ న్నారు. గణితంలో పట్టు సాధించటం ద్వారా విస్తృతమైన ఉపాధి అవకాశాలున్నాయన్నారు.

గణితంపై పట్టు సాధిస్తే ఇతర రంగాలపైనా అనూ వ్యాంగా పట్టు సాధించవచ్చు న్నారు. విద్యార్థులను ఉన్నతంగా తీర్చిదిద్దేందు కు వర్క్ షాప్ లు దోహ దపడతా యన్నారు. వర్క్ షాప్ బోర్డు ఆఫ్ హయ్యర్ మెథమెటిక్స్ కో ఆర్డినేటర్, యూనివర్సిటీ ఆఫ్ కలకత్తా గణిత శాస్త్ర విభాగ నిపుణులు అరిందమ్ సేన్ గుప్తా మాట్లాడుతూ వర్క్ షాప్ కు దేశ వ్యాపితంగా వచ్చిన 680 దరఖాస్తుల్లో 45 మందిని ఎంపిక చేసి ఆహ్వానించా మన్నారు. 15 రోజుల పాటు ఈ వర్క్ షాప్ జరుగుతుండన్నారు. ఈ కార్యక్రమంలో కళాశాల సెక్రటరీ అండ్ కరస్పాండెంట్ తూనుగుంట్ల శ్రీనివాస్, ప్రెసిడెంట్ డాక్టర్ వి. నారాయణరావు, వైస్ ప్రెసిడెంట్ డాక్టర్ కే. నవీన్ కుమార్, ఐఐటి మద్రాస్ కు చెందిన నిపుణులు అరిందమాసింగ్ విభాగాధిపతి ఎం. వేంకటేశ్వరరావు పాల్గొన్నారు.



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REPORT

The workshop will consist of courses in Linear Algebra, Analysis and Combinatorics including Probability Theory. Resource persons will be active mathematicians, probabilists or statisticians with a commitment to teaching from various leading institutions. The purpose of this programme is not to give routine lectures and theorem-proofs but to stimulate the participants to think independently, and to discover, appreciate and apply results on their own.

Day 1(2nd Dec 2019):

Session-I details: 2-12-2019, 9.30 A.M:

Dr. V. Narayana Rao, Principal, presided the session. The Chief Guest of the session was Prof. Arindam Sengupta, Academic coordinator and other Guest was Resource Person Prof. Sharad S. Sane, Chennai Mathematical Institute, SIPCOT IT Park, Siruseri, Chennai. Dignitaries of this session were Sri. T. Srinivas Garu, Secretary and Correspondent, Sri P.L. Ramesh, Director Academic and Planning, Dr. K. Naveen Kumar, Local Coordinator and Sri M. Venkateswara Rao, Head, Dept. of Mathematics & Statistics.

Principal in his address expressed that KBN College is happy to organise this workshop. He appreciated the participant's for taking part in the workshop and encouraged them. He considered that Mathematics & Statistics will enable them to more easily appreciate and understand the many uses of the modern world.

Session-II details: 2-12-2019, 10.45 A.M:

The Resource person for this session is Prof. Arindam Singh, In that he explained Basic Introduction to the topic Linear Algebra: Matrices, Matrix operations, row picture, column

picture, linear combinations of matrix multiplication, solving linear equations, eg:
 $x+2y+5z=8$, $2x+4y+z=7$, $x-y+z=2$.

Session-III details: 2-12-2019, 1.15 P.M

The Resource Person for this session is Prof. Arindam Sengupta , In that he explained the topic Rules of Algebra: Additive law $a+b=b+a$, Associative law $(a+b)+c=a+(b+c)$, Distributivity of multiplication over addition $a.(b+c)=ab+ac$, $a>0$, $b>0 \Rightarrow a+b>0$.

Session-IV details: 2-12-2019, 2.45 P.M

The Resource person for this session is Prof. Arindam Singh, In that he explained Basics of Row Reduced Echelon Form (RREF), each pivot is 1, except the pivot any entry in a pivotal column is 0, among any 2 pivots, if the row index of first is bigger than the row index of second then the column index, all zero rows are at the bottom.

Session-V details: 2-12-2019, 4.45 P.M

The Resource Person for this session is Prof. Arindam Sengupta, In this session he interacted with the students about the topic Rules of Algebra, there is a real number denoted by 1, if a is not zero there exists a real number denoted by a^{-1} such that $aa^{-1}=a^{-1}a=1$, if $x>y$ then for every z , $x+z > y+z$.

Day 2(3rd Dec 2019)

Session-I details: 3-12-2019, 9.00 A.M

The Resource person for this session is Prof. Arindam Singh , In that he explained Types of Elementary Matrices: Involuntary matrices, Idempotent matrices, if A is invertible then $AA^{-1}=A^{-1}A=I$, $A=E_1E_2...E_i$ are elementary matrices, every elementary matrix is a product of elementary matrices .

Session-II details: 3-12-2019, 10.45. A.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained Rules of Algebra: upper boundary : we call A bounded above if there exists a real number a which is an upper bound for A , Lower boundary: we call A bounded below if there exists real number b which is lower bound for A .

Session-III details: 3-12-2019, 1.15 P.M

The Resource person for this session is Prof. Arindam Singh , In that he explained Basics of vectors: Scalar multiplication, Dot product, elementary matrix type-I , elementary matrix type-II, elementary matrix type-III.

Session-IV details: 3-12-2019, 2.45 P.M

The Resource Person for this session is Prof . Sharad S.Sane, In that he explained Permutations: definitions, falling factorial , total functions, alphabets of size m and words of length n, $c(n,k)=c(n,n-k)$ if $0 \leq k \leq n$, binomial theorem and special cases, Newton binomial theorem .

Session-V details: 3-12-2019, 4.45 P.M

The resource person for this session is Prof. Arindam Singh, In that session he interacted with students about vectors with example sums.

Day 3(4th Dec 2019)**Session-I details: 4-12-2019, 9.00 A.M**

The Resource Person for this session is Prof . Sharad S.Sane, In that he explained Permutations : Formulae on with replacement, without replacement, binary, binary operations, binomial coefficient that are odd, oneline notation, cycle decompositions, colex order.

Session-II details: 4-12-2019, 10.45 A.M

The Resource person for this session is Prof. Arindam Singh , In that he explained the topic Matrices: Rank of Matrix, determinant, inverse of matrix, number of pivots in the RREF of matrix, 'r' is linearly independent if others are linear combinations of r.

Session-III details: 4-12-2019, 1.15 P.M

The Resource Person for this session is Prof. Arindam Sengupta, In that he explained the topic of Rules of Algebra: Properties and its proofs, $a+b=b+a$, $a+(b+c)=(a+b)+c$, for all x,y belongs to real number then $x+y=y+x$.

Session-IV details: 4-12-2019, 2.45 P.M

The resource person for this session is Prof. Arindam Singh, In that he explained the topic Linear Combinations: P is product of elementary matrices and performed any operations on PA doesn't changes its RREF and is same as A's RREF .

Session-V details: 4-12-2019, 4.45 P.M

The Resource Person for this session is Prof. Sharad S.Sane, In that he discussed Permutations: Cycle Forms, Implication Statement .

Day 4(5th Dec 2019)**Session-I details: 5-12-2019, 9.00 A.M**

The Resource person for this session is Prof. Arindam Singh, In that he explained the topic Linear Algebra: Linear dependency and independency, basis of subspace : let v be a subspace of real numbers, s is subset of v then s is called basis of v if s forms a subspace of v are linearly independent .

Session-II details: 5-12-2019, 10.45 A.M

The Resource Person for this session is Prof. Arindam Sengupta , In that he explained the topic of Rules of Real Analysis: Additivity, Multiplicative, upper boundary : we call A bounded above if there exists a real number a which is an upper bound for A , Lower boundary: we call A bounded below if there exists real number b which is lower bound for A .

Session-III details: 5-12-2019, 1.15 P.M

The Resource Person for this session is Prof. Sharad S.Sane, In that he explained the topic Combinations: Definitions, With replacement, Without replacement, , falling factorial , total functions, alphabets of size m and words of length n , $c(n,k)=c(n,n-k)$ if $0 \leq k \leq n$, binomial theorem and special cases, Newton binomial theorem .

Session-IV details: 5-12-2019, 2.45 P.M

The Resource Person for this session is Prof. Arindam Sengupta, In that he explained the problems of real analysis: $a \leq x \leq b$, A is countable if A is finite or countably infinite, Countable union of countable sets is countable.

Session-V details: 5-12-2019, 4.45 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In this session he discussed basic real analysis examples.

Day 5(6th Dec 2019)

Session-I details: 6-12-2019, 9.00 A.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained the topic Real Analysis: Lemma theorem and its proofs, : upper boundary : we call A bounded above if there exists a real number a which is an upper bound for A, Lower boundary: we call A bounded below if there exists real number b which is lower bound for A.

Session-II details: 6-12-2019, 10.45 A.M

The Resource Person for this session is Prof. Sharad S.Sane, In that he explained the topic Combinations and exercise sums, multinomial theorem, cycle forms, decompositions, , binomial coefficient that are odd, oneline notation, cycle decompositions, colex order.

Session-III details: 6-12-2019, 1.15 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained Real Analysis: examples related to lemma theorem, Strictly increasing, strictly decreasing, A, B is non-empty subsets of \mathbb{R} , both bounded above $a = \sup(A)$, $b = \sup(B)$.

Session-IV details: 6-12-2019, 2.45 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: Finite Sample Space, power set, Infinite Sample Space, axioms, kolmogorov finite probability space, events, experiment, random experiment.

Session-V details: 6-12-2019, 4.45 P.M

The Resource Person for this session is Prof. Sharad S.Sane, In that he gave some exercise problems for students regarding the topic of combinations, falling factorial, total functions, alphabets of size m and words of length n , $c(n,k)=c(n,n-k)$ if $0 \leq k \leq n$, binomial theorem and special cases, Newton binomial theorem.

Day 6(7th Dec 2019)**Session-I details: 7-12-2019, 9.00 A.M**

The Resource Person for this session is Prof. Sharad S.Sane, In that he explained Sets: Union, Intersection, Subsets, Formulae on with replacement, without replacement, binary, binary operations, binomial coefficient that are odd, oneline notation, cycle decompositions, colex order etc.

Session-II details: 7-12-2019, 10.45 A.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: Countably Infinite, Sub Space, Bernoulli has no generalization in the case of countably infinite, Poisson distributions.

Session-III details: 7-12-2019, 1:15 P.M

The Resource Person for this session is Prof. Sharad S.Sane, In that he explained Functions: Bijection, Interjection, the number of ways of solving the equations $x_1+x_2+\dots+x_r=k$ in positive integers is equal to $(k-1)C_{(r-1)}$.

Session-IV details: 7-12-2019, 2:45 P.M

The Resource Person for this session is Prof. Arindam Sengupta, In that he explained the topic Functions: one-one, onto, Sequences, open and closed sets, interiors, clousers, limit points, compacts sets.

Session-V details: 7-12-2019, 4.45 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he interacted with the students regarding topics that are discussed earlier: Infinite Sample Space, Countably Infinite.

Day 7(8th Dec 2019) - Excursion

Day 8(9th Dec 2019)

Session-I details: 9-12-2019, 9.00 A.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: Uncountably Infinite Sample Space, properties of probability function, addition theorem, Independence of events.

Session-II details: 9-12-2019, 10.45 A.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained the topic Sets: Power Sets,Sub Sets, Algebra, modulus function, boundedness, infima and suprema.

Session-III details: 9-12-2019, 1:15 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: Properties of probability ,addition theorem, mutual independence, pairwise independent events.

Session-IV details: 9-12-2019, 2:45 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained Real Analysis: Sandwich theorem and examples, Sub Sets, Algebra, modulus function, boundedness, infima and suprema.

Session-V details: 9-12-2019, 4:45 P.M

The Resource Person for this session is Prof . Arindam Sengupta, In that he gave some exercise problems.

Day 9(10th Dec 2019)

Session-I details: 10-12-2019, 9.00 A.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he discussed Real Analysis: Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses.

Session-II details: 10-12-2019, 10.45 A.M

The Resource person for this session is Prof. Arindam Singh, In that he explained the topic Linear Algebra: basis of subspace, SPAN, Cauchy-schwartz inequality, proof of triangle inequality, pythagorous theorem, parallelogram.

Session-III details: 10-12-2019, 1:15 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained the topic : Series, Jordan Decomposition, strictly increasing, strictly decreasing, open and close intervals trivial intervals.

Session-IV details: 10-12-2019, 2.45 P.M

The Resource person for this session is Prof. Arindam Singh, In that he explained the topic Linear Algebra: Norms, Cauchy-Schwartz inequality, basis of subspace, SPAN, Cauchy-schwartz inequality, proof of triangle inequality, pythagorous theorem, parallelogram.

Session-V details: 10-12-2019, 4:45 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained the topic sequences and related problems.

Day 10(11th Dec 2019)**Session-I details: 11-12-2019, 9.00 A.M**

The Resource person for this session is Prof. Arindam Singh, In that he explained the topic Vectors: Inequality theorems and its proofs, exercises, basis for $R(A)$ and $N(A)$ of $5x+2y-3z=2$, $10x+4y+5z=5$, $-5x-2y+3z=-2$.

Session-II details: 11-12-2019, 10.45 A.M

The Resource Person for this session is Prof . Arindam Sengupta, In that he explained the topic sequences related theorems: Cauchy, Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses, and exercises etc.

Session-III details: 11-12-2019, 1.15 P.M

The Resource person for this session is prof. Venu Thangaraj. In that he explained the topic Probability: Dependency and Independency of events, conditional probability, multiplication theorem, Bayes theorem, sample space description.

Session-IV details: 11-12-2019, 2.45 P.M

The Resource Person for this session is Prof . Arindam Sengupta . In that he explained the topic Real Analysis: Bolzano-Weierstrass theorem for sequences, Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses.

Session-V details: 11-12-2019, 4.45 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he discussed the problems and examples related to Probability.

Day 11(12th Dec 2019)**Session-I details: 12-12-19, 9.00 A.M**

The Resource Person for this session is Prof . Arindam Sengupta, In that he explained theorems related to Sequences, Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses.

Session-II details: 12-12-2019, 10.45 A.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: Conditional Probability, Bayes Theorem, Multiplication Theorem, random variable, discrete random variable, continuous random variable.

Session-III details: 12-12-2019, 1.15 P.M

The Resource Person for this session is Prof . Arindam Sengupta, In that he explained Upper bound and Lower bound theorems: Infimum and Supremum, Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses.

Session-IV details: 12-12-2019, 2:45 P.M

The Resource person for this session is Prof. Arindam Singh, In that he explained the topic Vectors: Vector Projection($a+bi$), projection of x on vector y , least squares solutions, regression lines.

Session-V details: 12-12-2019, 4.45 P.M

The Resource person for this session is Prof. Arindam Singh, In that he discussed the problems related to RREF.

Day 12(13th Dec 2019)**Session-I details: 13-12-2019, 9.00 A.M**

The Resource person for this session is prof. Venu Thangaraj, In that he the Probability: Conditional Probability, types of random variables: Discrete, continuous random variables, distribution functions, continuous functions, discontinuous functions.

Session-II details: 13-12-2019, 10.45 P.M

The Resource Person for this session is Prof . Arindam Sengupta, In that he explained theorems related to Sequences: Bounded above and monotonically increasing, Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses.

Session-III details: 13-12-2019, 1.15 P.M

The Resource person for this session is Prof. Arindam Singh, In that he discussed the problems related to RREF, Bessel, Orthogonal lists.

Session-IV details: 13-12-2019, 2.45 P.M

The Resource Person for this session is Prof . Arindam Sengupta , In that he explained theorems related to Sequences: Boundary Values(upper bound, Lower bound), Boltzman-Maxwell theorem, inductive sets, well-ordering, converses, Bounded below, Monotonically decreasing.

Session-V details: 13-12-2019, 4.45 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic related to Random variables and its types, finite Additivity + Axiom continuity \Leftrightarrow countable Additivity, monotonically increasing, monotonically decreasing.

Day 13(14th Dec 2019)**Session-I details: 14-12-2019, 9.00 P.M**

The Resource Person for this session is Prof . Arindam Sengupta, In that he explained theorems related to Sequences: Convergent, Divergent, disjoint sets, Nested intervals theorem, Heine-Borel theorem.

Session-II details: 14-12-2019, 10.45 A.M

The Resource Person for this session is Dr.V.S.Vaidyanathan, In that he explained basics of R : history of R, characteristics of R, Limitations of R, variable declaration, assigning values to the variables, $a < -11$, $a = 1$, `assign("a", 1)`, installing packages, classes of variables, etc.

Session-III details: 14-12-2019, 1.15 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: distributions and its expectations, exercises, expectation of a random variable, raw moments, absolute moments, central moments, one point distribution, two-point distribution, binomial distribution.

Session-IV details: 14-12-2019, 2.45 P.M

The Resource Person for this session is Dr.V.S.Vaidyanathan, In that he explained the topic R-programming: vectors, vector creation, and its operations (add, sub, multiplication), $v = c(1,2,3,4,5,6,7,8)$, using combine operator, $v = 1:10$, using sequence operator, help functions, vectorised arithmetic.

Session-V details: 14-12-2019, 4.45 P.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Distributions: M.G.F, P.G.F, C.F and its Properties, poisson distribution, series convergent,

probability mass functions, probability density functions, PMF, PDF, method of distributions, method of transformations, method of conditioning, method of M.G.F.

Day 14 (15th Dec 2019)

Session-I details: 15-12-2019, 9.00 A.M

The Resource Person for this session is Dr.V.S.Vaidyanathan, In that he explained with the topic R-Programming: matrices, matrix creation, and its operations (determinant, inverse, adding, multiplication), $a = \text{matrix}(1:9,3,3)$, using matrix function, det of a matrix using det function, inverse of matrix using solve function, etc.

Session-II details: 15-12-2019, 10.45 A.M

The Resource person for this session is prof. Venu Thangaraj, In that he explained the topic Probability: functions of distributions, Feynman Integration method, Feynman differentiation method, C.G.F, Exponential distribution, Normal distribution, non-degenerate integrable random variable, M.G.F and its properties.

Session-III details: 15-12-2019, 1.15 P.M

The Resource Person for this session is Dr.V.S.Vaidyanathan, In that he explained the topic R-Programming: norm of vectors, correlation using inner product, diagonal matrix, Distributions(pnorm, dnorm, rnorm), Plots (Histogram, pie-chart, bar graphs, etc).

Session – IV details: 15-12-2019, 3.15 P.M

The valedictory session was conducted on 15th December, 2020.

The Chief Guests for the session were Prof. (Retd.) Venu Thangaraj, Ramanujam Institute of Advanced Studies in Mathematics, University of Madras, Chepauk, Chennai, Dr. V.S. Vaidyanathan, Department of Statistics, Ramanujam School of Mathematical Sciences, Pondicherry University, Kalapet, Puducherry. On his address, he pondered on the importance of the workshops and he mentioned that students must observe the things around and absorb updated knowledge. He also added that students must be ready for the change and lucid of information. He appreciated the students for participating in this workshop.

The session was continued with the feedbacks from the participants. The participants from other colleges gave a satisfactory feedback they acknowledged the college resources which were good enough for the success of the workshop. They thanked KBN Management for organizing this workshop which is a need in current market. The session followed with the Certificate distribution.

MTUSS-2019 - Schedule

	9:00-10:30		10:30-10:45	10:45-12:15	12:15-13:15	13:15-14:45	14:45-16:15	16:15-16:45	16:45-17:30
02/12/19 Monday	Inauguration (9-9:30)	Foundations 1 (9:30 -10:30)	TEA	Linear Algebra 1	Lunch	Analysis 1	Linear Algebra 2	Snacks	Discussion /Tutorial/Seminar
03/12/19 Tuesday	Linear Algebra 3			Analysis 2		Linear Algebra 4	Foundations 2		
04/12/19 Wednesday	Foundations 3			Linear Algebra 5		Analysis 3	Linear Algebra 6		
05/12/19 Thursday	Linear Algebra 7			Analysis 4		Combinatorics 1	Analysis 5		
06/12/19 Friday	Analysis 6			Combinatorics 2		Analysis 7	Probability 1		
07/12/19 Saturday	Combinatorics 3			Probability 2		Combinatorics 4	Analysis 8		
08/12/19 Sunday	BREAK								
09/12/19 Monday	Probability 3		TEA	Analysis 9	Lunch	Probability 4	Analysis 10	Snacks	
10/12/19 Tuesday	Analysis 11			Linear Algebra 8		Analysis 12	Linear Algebra 9		
11/12/19 Wednesday	Linear Algebra 10			Analysis 13		Probability 5	Analysis 14		
12/12/19 Thursday	Analysis 15			Probability 6		Analysis 16	Linear Algebra 11		
13/12/19 Friday	Probability 7			Analysis 17		Linear Algebra 12	Analysis 18		
14/12/19 Saturday	Analysis 19			R Programming 1		Probability 8	R Programming 2		
15/12/19 Sunday	R Programming 3			Probability 9		R Programming 4	Analysis 20		

Inaugural Session: 2nd December, 2019

9.00 – 9.02	Inviting the guests by Sri. V. S. Ramanjanayulu
9.02 – 9.04	Prayer song
9.04 – 9.06	Lighting the lamp
9.06 – 9.15	Opening remarks by the Principal, Dr. V. Narayana Rao
9.15 – 9.17	Speech by Sri Tunuguntla Srinivasu, Secretary & Correspondent, K.B.N. College Committee
9.17 – 9.19	Workshop outline by Local Coordinator, Dr. Naveen Kumar Kakumanu
9.19 – 9.24	Speech by the Academic coordinator, Prof. Arindam Sengupta
9.24 – 9.27	Felicitation to the Chief Guests
9.27 – 9.29	Vote of thanks: Sri M. Venkateswara Rao, Head, Dept. of Mathematics & Statistics
9.29 – 9.30	Group Photo

Valedictory Session: 15th December, 2019

5.30 – 5.35	Inviting the guests by Sri. Y. Ravi Babu
5.35 – 5.40	Closing remarks by the Principal Dr.V.Narayana Rao
5.40 – 5.45	Speech by the Chief guest Prof. V.S. Vaidyanathan
5.45 – 5.50	Speech by the Chief guest Prof. V. Thangaraj
5.50 – 5.55	Speech by the Coordinator Prof. Arindam Sengupta
5.55 – 6.00	Felicitation to the Resource Persons
6.00 – 6.05	Feedback from the participants
6.05 – 6.15	Vote of thanks: Ch. Radhika

List of Participants for MTUSS - 2019

S. No	Full Name	College Full Name	State
1	Ragini Jakkam	Ahmednagar College	Maharashtra
2	Sushil Babasaheb Wadekar	Ahmednagar College	Maharashtra
3	Afan Rahman U P	Farook College (Autonomous)	Kerala
4	Fidha Thasneem P T	Farook College (Autonomous)	Kerala
5	Chethan Rao M	Gandhi Institute of Technology & Management	Karnataka
6	Aiswarya Shibu	Pondicherry University	Pondicherry
7	Jayasri S	Pondicherry University	Pondicherry
8	Revathy B Jayaraj	Pondicherry University	Pondicherry
9	Prithwish Ghosh	Sister Nivedita University	West Bengal
10	Soumyajit Nandy	Sister Nivedita University	West Bengal
11	Yuvanthica Sabapathy	Madras Christian College	Tamilnadu
12	B.Ravali Sai	Bhavans Vivekananda Degree College	Telangana
13	Tejaswi Kidambi	Bhavans Vivekananda Degree College	Telangana
14	Nandini Naidu	Chaitanya Bharathi Degree College	Telangana
15	Sirisha Patibandla	Chaitanya Bharathi Degree College	Telangana
16	D.Geethika	Loyola Academy Degree And P.G College	Telangana
17	Doni Tejashwini	Loyola Academy Degree And P.G College	Telangana
18	Pranitha Samala	St.Ann's College For Women	Telangana
19	Radhika Bathula	St.Ann's College For Women	Telangana
20	A.J. Aditya	Kakaraparti Bhavanarayana College	Andhra Pradesh
21	Bhargavi. Salapu	Kakaraparti Bhavanarayana College	Andhra Pradesh
22	Bhavya Sri Kollapudi	Nalanda Degree College	Andhra Pradesh
23	Boddu Sailavanya	Nalanda Degree College	Andhra Pradesh
24	Dharani Varri	Maharaja College (Autonomous)	Andhra Pradesh
25	Hindusri Vodugu	Akkineni Nageswara Rao College	Andhra Pradesh
26	Indu Anem	Sri Gcsr College	Andhra Pradesh
27	K. Pravalika	Kakaraparti Bhavanarayana College	Andhra Pradesh
28	M. Geetika	Kakaraparti Bhavanarayana College	Andhra Pradesh
29	Madhu Venkat Kukkala	Sri Y N College	Andhra Pradesh
30	Mudili Sneha	Kakaraparti Bhavanarayana College	Andhra Pradesh
31	Nelofar Shaik	Kakaraparti Bhavanarayana College	Andhra Pradesh
32	P. Hema Sagar	Kakaraparti Bhavanarayana College	Andhra Pradesh
33	Poojitha.Maddala	Akkineni Nageswara Rao College	Andhra Pradesh
34	Prudhviraju Parupalli	Maharaja College (Autonomous)	Andhra Pradesh
35	Rajeswari Gurajapu	Sri Raja Rangayya Apparao & Chunduri Venkatareddy	Andhra Pradesh
36	Rajitha Triveni Koralla	Sri Y N College	Andhra Pradesh
37	Sagar Raju Bondla	Mrs.A.V.N College	Andhra Pradesh
38	Sai Harsha Alapati	Nalanda Degree College	Andhra Pradesh
39	Sk. Basheer Ahmed	Kakaraparti Bhavanarayana College	Andhra Pradesh
40	Sowmya Gadiraju	Nalanda Degree College	Andhra Pradesh
41	V. Jagadeeswari	Kakaraparti Bhavanarayana College	Andhra Pradesh
42	V. Sri Lakshmi	Kakaraparti Bhavanarayana College	Andhra Pradesh
43	Veeramani Odhuri	P.B.Siddhartha College Of Arts And Science	Andhra Pradesh
44	V.S.K.Karthikeya Sarma.Nittala	Pithapur Rajah's Government College	Andhra Pradesh