क्रमांकः **3991** /अका./2015   रायपुर, दिनांकः **01**/07/2015

// अधिसूचना //

विद्या संबंधी योजना एवं मूल्यांकन बोर्ड की बैठक दिनांक 03.07.2014 में इंजीनियरिंग स्नातक छात्रों को एम.एस-सी. गणित में प्रवेश हेतु Bridge Course के माध्यम से एम.एस-सी. गणित में प्रवेश संबंधी प्रस्ताव का अनुमोदन किया, जिसे कार्यपरिषद् की बैठक दिनांक 18.07.2014 में विषय क्रमांक 3 पर अनुमोदित है। विनियम (Regulation) निम्नांकित हैः-

Regulation No. - 162
Bridge Course for M.Sc. Mathematics
[E.C.-18-07-21014]

1. **Objective :** The objective of this regulation is to provide opportunity through the bridge course to the Engineering graduate students for pursuing master's degree course in Mathematics of Pt. Ravishankar Shukla University, Raipur.

2. **Scope:** The scope of this regulation shall be limited to the MA/MSc courses in mathematics subject run by the Pt. Ravishankar Shukla University only.

3. **Eligibility:** Only those candidates shall be eligible to appear in this bridge course who has obtained B.E./B.Tech. in any discipline of Engineering.

4. **Examination:** University will conduct a written examination in the University Campus based upon the syllabus approved by Board of Studies in mathematics.

5. **Success:** A candidate will be declared successful in the said written examination by the University if he/she obtains minimum 36% marks or above in aggregate.

6. **Certificate:** University will issue a certificate to the candidate who will be declared successful in the said above examination mentioning his/her success in the said examination with year and declare him/her eligible for applying for admission/appearing in examination of M.Sc. course in Mathematics subject run by any College affiliated to the University.

कुलसचिव

पृ. क्रमांकः **8992** /अका./2015   रायपुर, दिनांकः **01**/07/2015

प्रतिलिपि :

1. सचिव, उच्च शिक्षा विभाग, मंत्रालय, महनदी भवन, नया रायपुर

2. आयुक्त, उच्च शिक्षा, ब्लॉक-सी-30, द्वितीय एवं तृतीय तल, इन्द्रावती भवन, नया रायपुर

3. प्राचार्य, समस्त सम्बद्ध महाविद्यालय,

4. अध्यक्ष, समस्त अध्ययनशाला,

5. समस्त विभागीय अधिकारी,

6. कुलपति के सचिव/कुलसचिव के निजी सहायक, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर को सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित।

उप कुलसचिव (अका.)

Bridge Course for Engineering Graduates

for M.Sc. degree in Mathematics subject

Paper I (Code – BCM -01)   M.M.100

Algebra

UNIT-I   Matrices, different types and operations on matrices. Inverse matrix. Rank, linearity, equivalence and congruence in matrices. Group and its simple properties. Cyclic group, generator, Cosets. Lagranges, Formate and Euler's theorems. Normal subgroups. Quotient group, Permutation group and Cayley's theorem.

UNIT-II Homo, Iso, and automorphism in group and their computation. Conjugacy, Normaliser, and class equation of a finite group. Group of prime order. Abelian group and its universal property. Sylow's theorems and Sylow subgroup. Ring, Subring, Integral domain, fields and their properties. Ideals, Quotient ring, Euclidean ring, and polynomial ring.The Eisenstein criterion, and Unique factorization. Modules, submodules, and quotient module.

UNIT-III Vector space, Subspaces. Sum of subspaces. Linearity and basic property in vector space. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a subspace of a finite dimensional vector space. Dimension of sums of subspaces, quotient space and its dimension.

UNIT-IV Linear transformations: Linear transformations and their representation as matrices. The algebra and linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear quadratic and Hermitian forms.

UNIT-V Inner product spaces, Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthogonal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt orthogonalization process.

Reference books:

1. I.N.Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi, 2000.
3. N. Jacobi son,Basic Algebra, Vol. I & II , W.H., Freeman, 1980(also published by Hindustan Publishing Company).
4. P.B. Bhattacharya, S.K. Jain And S.R. Nagpaul, First Course in Linear Algebra, Wiley Eastern, New Delhi, 1983.
5. Shanti Narayan, A Text Book of Modern Abstract Algebra, S. Chand & Co., New Dehli.
6. Chandrika Prasad, Text Book on Algebra and Theory of Equations, Pothishala Private Ltd., Allahabad.
7. S.L.Loney, Plane Trigonometry Part II, Macmilan and Company, London.

Calculus

UNIT-I   Continuity, sequential continuity, uniform continuity and properties of continuous functions. Chain rule. Mean value theorems and their geometrical interpretation. Darboux's intermediate value theorem. Taylor's theorem and various forms of remainders. Limit and continuity of functions of two variables, Partial differentiation, Change of variables, Euler's theorem,, Taylor's theorem for function of two variables, Jacobians.

UNIT-II   Envelopes, Evolutes, Maxima, minima and saddle points of functions of two variables, Lagrange's multipliers methods. Beta and Gamma functions, Double and triple integrals. Dirichlet's integrals, change of order of integration in double integrals.

UNIT-III Series solutions of differential equations, Power series method, Bessel and Legendre functions and their properties-convergence, recurrence and generating relations. Orthogonality of functions, Sturm-Liouville problem, orhtogonality of Eigen-fucntions. Reality of eigen values, orthogonality of Bessel functions and Legendre polynomials.

UNIT-IV Second order Linear differential equations, Transformation of equation by changing dependent / independent variable. Method of variation of parameters. Ordinary simultaneous differential equations. Partial and linear differential equations of second and higher orders & PDEs reducible to equations with constant coefficients. Homogeneous & non-homogeneous equations with constant coefficients.

UNIT-V   Variational problems with fixed and moving boundaries. Euler's equation for functional containing first order derivative and one independent variable externals, Functional dependent on more than one independent variables, Variational problems in prarametric function. Euler's equation under coordinate transformation. Functional dependent on one and two functions. Jacobi and Legendre conditions, , Variational principle of least action.

Reference books:
1. Gorakh Prasad, Differential Calculus, Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd., Allahabad.
3. D.A. Murray, Introduct6ion Course in Diffrential Equation,Orient Longman(India).1976.
4. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co, New York,
5. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S.Chand & Co. New Delhi, 2000.
6. G.F. Simmons, Differential Equations, Tata McGraw Hill, 1972.
7. E.A. Codington, An Introduction to ordinary differential Equations, Prentice Hall of India, 1961.
8. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S Publisher & Distributors, Delhi, 1985.

Paper III(Code – BCM -03)   **M.M.100**

Analysis

UNIT-I   Limit and continuity of a function & its properties, classification of discontinuities. Differentiability, Asymptotes, curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion.

UNIT-II Series of non-negative terms. Comparison tests, Cauchy's integral test. Ratio tests, Raabe's logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz theorem. Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivative and differentiability of real-valued functions of two variables. Schwarz, Young's & Implicit function theorem.

UNIT-III Riemann integral. Integration of continuous and monotonic functions. The fundamental and Mean value theorems of integral calculus. Convergence in improper integrals. Comparison test, Abel's and Dirichlet's test. Continuity, derivability and integrability of an integral of a function of a parameter.

UNIT-IV Definition and examples of metric spaces. Neighbourhoods, limit points, interior points, open and closed sets, closure and interior. Boundary points, sub-space of a metric space. Cauchy sequences, completeness, Cantor's intersection theorem. Contraction principle. Construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

UNIT- V Dense subsets. Baire category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, Isometry and homeomorphism. Equivalent metrics. Compactness, sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets, connectedness, components, continuous functions and connected sets.

Reference *books* :
1. T.M. Apostol, Mathematical Analysis, Norosa Publishing House, New Delhi, 1985.
2. R.R. Goldberg, Real Analysis, Oxford & IBH publishing Co., New Delhi, 1970.
3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. D. Somasundaram and B. Choudhary, A First Coarse in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co. New Delhi.
6. E.T. Copson, Metric Spaces, Cambridge University Press, 1968.
7. P.K. Jain and K. Ahmad, Metric Spaces, Narosa Publishing House, New Delhi, 1996.
8. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
9. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co. New York,
10. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S.Chand & Co. New Delhi, 2000.