



Veer Bahadur Singh Purvanchal University, Jaunpur
(Established under UP State University Act, 1973)
(A NAAC Accredited University)



ADMISSION ANNOUNCEMENT (Session 2019-2020)

**MA (Mathematics) (Direct admission for B.A. passed candidates), M.Sc. (Applied Psychology who are B.Sc. passed),
BCA (Direct admission of 12th passed candidates)**

Courses are also introduced from this Session.

**The last date for applying direct admission in BCA, MA
(Mathematics) is 10th June 2019.**

**The last date for applying admissions through entrance test in
remaining courses is 8th June 2019.**

All candidates have to apply through online mode.

PURVANCHAL UNIVERSITY COMBINED ADMISSION TEST (PUCAT-2019)

Veer Bahadur Singh Purvanchal University invites application for admission to various courses in the campus. The University is committed to provide need based education relevant to the dynamic socio-economic environment contributing to the growth of the region.

The Key Highlights of the University are:

- Efficiently functioning Training & Placement Cell resulting into **more than 2000 students placed in reputed multinational companies through Campus selection** process during last and current session.
- **Conveyance facility** by BUS from Jaunpur to Purvanchal University campus.
- Prof. Rajendra Singh (Rajju Bhaiya) research centre has **well equipped laboratories with rarely available advanced research facilities at a place in our country** like **SEM-EDS, HR-TEM, XRD, FTIR, UV VIS, APS-100, TPS-500S**
- **Two Research Centers:** Renewable Energy Research Centre, Nano Science & Technology.

- Separate hostel facilities for girls and boys.
- 24*7 fiber optic supported **high speed internet facility** in the campus.
- The Centre of Excellence library with **book bank and E-resources**. Infrastructure for learning through virtual class (EDUSAT). Library identified as a **Centre of Excellence** by the Government of Uttar Pradesh.
- **Well-equipped laboratories** in the Departments.
- Holistic development of students through sports, cultural and extracurricular activities supported by equipped **Gymnasium, Stadium and Auditorium**.
- **UGC sponsored remedial coaching classes** for OBC, SC/ST & minority students.
- **Free coaching to IAS/PCS** aspirants in campus.
- **Smart classrooms with video recording** facilities.
- **TEQIP-III supported B.Tech programs**
- **DST-FIST supported M.Sc. program**

How to Apply:

1. Applications form is to be filled through **ONLINE mode only**.
2. About more details one can visit the University website www.vbspu.ac.in or directly go to www.vbspu.ac.in/pucat-2019/
3. **Online application fee is Rs. 500/- for Unreserved and OBC category and Rs. 250/- for the candidates belonging to SC/ST.** Printout of the completed Application Form along with self attested copies of certificates/testimonials must reach in the office of **The “Chairman, Admission Cell (PUCAT-2019), V. B. S. Purvanchal University, Jaunpur-222003, U.P.” latest by 10th June, 2019 at 5.00 PM** through registered post. However, the application form can be submitted by hand in **The Admission Cell (office is located at ground floor of Administration building of Purvanchal University) also.**

IMPORTANT DATES

Online application form is available from	15th March, 2019
Last Date for Submission of online Application form	8th June, 2019
Download date of admit card	10th June, 2019
Date of Entrance Test	11th-12th June, 2019*
Announcement of Result	21st June, 2019
Date of Admission	1st - 5th July, 2019

In case of any difficulty regarding downloading of admit card, candidate can contact **on 10th June, 2019 at 11.00 AM** to the **Admission Cell (office is located at ground floor of Administration building of Purvanchal University), V. B. S. Purvanchal University, Jaunpur with TWO passport size photographs and a photocopy with original ID proof.**

*For details of exam schedule refer to page no. 6 of the brochure.

Important Information: The University shall not be responsible for any kind of postal delay. All the admissions shall be provisional subject to meeting the prescribed norms. Candidates appearing in the final year examination of the qualifying degree are also eligible. Scholarship facility will not be provided on Additional seats*.

Helpline Contacts: Please feel free to contact us at following numbers for any admission related query. You can also reach us through mail at pucacat2019@gmail.com

Courses Offered

1. FACULTY OF MANAGEMENT STUDIES

UG Programmes				
Course(s)	Eligibility	No. of seats	Annual fees (Rs.)	Additional seats*
B. Com. (Hons)	Intermediate or equivalent examination with commerce or economics or mathematics as one of the subjects of study. (40% marks for Gen/OBC & 33 % for SC/ST.	60	10,000	--

PG Programmes					
Department	Course(s)	Eligibility	No. of seats	Annual fees (Rs.)	Additional seats*
Business Management	M.B.A.	Graduate in any discipline with minimum of 45% marks (40% for SC/ST and OBC) or Post Graduate with 55% marks (50% for SC/ST and OBC)	60	51000	40
	M.B.A. (Agri Business)		60	51000	40
	M.B.A. (E-Commerce)		60	51000	40
Business Economics	M.B.A. (Business Economics)		60	51000	40
Financial Studies	M.B.A.(Finance & Control)		60	51000	40
Human Resource Development	M.B.A.(HRD)		60	51000	40

Note:

- 30 Seats in M.B.A. (HRD), M.B.A. (Business Economics) and M.B.A. (Finance and Control) will be filled through PUCAT-2019 and remaining 30 seats through UPSEE-2019)

- Admission in the above courses will be initially from UP State Entrance Examination (UPSEE-2019). In case seats lie vacant after UPSEE-2019 counseling, admissions for M.B.A. courses shall be made through PUCAT-2019.

2. FACULTY OF APPLIED SOCIAL SCIENCE AND HUMANITIES

Department	Course(s)	Eligibility	No. of seats	Annual fees (Rs.)	Additional seats*
Applied Psychology	M.A and M.Sc.* (Applied Psychology)	Graduate in any discipline with minimum 45% marks (5% relaxation to SC/ST candidates)	60	31000	20
Mass Communication	M.A (Mass Communication)		60	31000	20

*The candidate having B. Sc will get M. Sc (Applied Psychology) degree

- Admission shall be made through PUCAT-2019.

3. FACULTY OF SCIENCE

PG Programmes					
Department	Course(s)	Eligibility	No. of seats	Annual fees (Rs.)	Additional seats*
Biotechnology	M.Sc. (Biotechnology)	Graduate in Biology/medicine group with minimum 50% marks	60	51000	40
Microbiology	M.Sc. (Microbiology)	B.Sc. (Biology/Life science) with minimum 50% marks	60	51000	40
Biochemistry	M.Sc. (Biochemistry)	B.Sc. (Biology/Life science) with minimum 50% marks	60	51000	40
Environmental Sciences	M.Sc. (Environmental Science)	B.Sc. (Biology/Life science/agriculture/mathematics) with minimum 50% marks	60	51000	40

- Admission shall be made through PUCAT-2019.

4. PROF. RAJENDRA SINGH (RAJJU BHAIYA) INSTITUTE OF PHYSICAL SCIENCES FOR STUDY & RESEARCH

PG Programmes				
Department	Course(s)	Eligibility	No. of seats	Annual fees (Rs.)
Physics	M.Sc. (Physics)	B.Sc. with Physics as a subject up to 3 rd year and Mathematics as a subject at least up to 1 st year from a recognized university	60	21000
Chemistry	M.Sc. (Chemistry)	B.Sc. with Chemistry as a subject up to 3 rd year from a recognized university	60	21000

Mathematics	M.Sc. (Mathematics) Admission through PUCAT-2019	B.Sc. with Mathematics as a subject up to 3 rd year from a recognized university	60	21000
	MA (Mathematics) Direct admission	B.A. with Mathematics as a subject up to 3 rd year from a recognized university		
Earth and Planetary Science	M.Sc. (Applied Geology)	B.Sc. with any two of the following subject Geology, Physics, Mathematics, Chemistry and Life Sciences (Zoology and/or Botany) from a recognized University.	60	21000

- Admission shall be made through PUCAT-2019.

5. FACULTY OF MEDICINE

Department	Course(s)	Eligibility	No. of seats	Annual fees (Rs.)
Pharmacy	B.Pharm	As per UPSEE-2019	60	76000
	B.Pharm (lateral Entry)	D. Pharm. with First Division	Against vacant seats	76000

- Admission shall be through UP State Entrance Examination (UPSEE-2019). In case seats lie vacant after UPSEE-2019 counseling, admissions shall be made through UPSEE-2019 qualified candidates.

6. FACULTY OF LAW

Course(s)	Eligibility	No. of seats	Annual fees (Rs.)
B.A. LL.B. (Hons.) [5 Yrs. Integrated Course]	Intermediate or equivalent examination (45% for UR, 42% for OBC & 40% for SC/ST).	120	40000

7. FACULTY OF ENGINEERING & TECHNOLOGY

Department	Course(s)		Eligibility and Mode of Admission	No. of seats	Annual fees (Rs.)	Additional seats* for UG courses
	UG	PG				
Computer Science and Engineering	B. Tech (CSE)	----		60	61000	40
Electronics and Communication Engineering	B. Tech (ECE)	----		60	61000	40

Electrical Engineering	B. Tech (EE)	----	As per UPSEE - 2019	60	61000	40
Electronics and Instrumentation Engineering	B. Tech (EI)	----		60	61000	40
Information Technology	B. Tech (IT)	----		60	61000	40
Mechanical Engineering	B. Tech (ME)	----		60	61000	40
Computer Applications	----	MCA		60	61000	40
Computer Application	BCA (3 yr course)	--	10+2 passed in any subject	100	20000	nil

A. Admission shall be through UP State Entrance Examination (UPSEE-2019). **In case seats lie vacant after UPSEE-2019 counseling, admissions shall be made in B. Tech courses only for UPSEE-2019 qualified candidates.**

B. Admission in MCA will be initially from UP State Entrance Examination (UPSEE-2019). **In case seats lie vacant after UPSEE-2019 counseling, admissions for M.C.A. courses shall be made through PUCAT-2019.**

C. Admission in BCA shall be made through PUCAT-2019.

Reservation of Seats: Reservation of seats shall be as per the U. P. State Government/ University norms. Relaxation of 5% marks in the qualifying degree examination is applicable for SC/ST candidates. University also reserves the rights to admit University Employee wards as per VBS PU rules.

Additional seats*: For additional seats (Direct Admission) fee is Rs. 1,00,000/- per year

Important Contacts:

Name	Institute/Faculty/Department concerned	Contact
Dr. Nitesh Jaiswal	Prof. Rajendra Singh (Rajju Bhaiya) Institute of Physical Sciences & Research (Physics, Chemistry, Mathematics and Applied Geology)	9598035520
Dr. Dharmendra Singh	Pharmacy	9721688766
Dr. Rajnish Bhasker	Engineering & Technology	8808809431
Dr. Raj Kumar	Engineering & Technology	9451160911
Dr. Saurabh Pal	Computer Application	9044487708
Prof. Ajay Dwivedi	M.B.A. (Finance & Control)	8808231000
Prof. Manas Pandey	M.B.A. (Business Economics)	9415207029
Dr. Murad Ali	M.B.A.	9415980763
Prof. Avinash Pathardikar	M.B.A. (HRD)	9450873419
Dr. Digvijay Singh Rathor	Mass Communication	7905262713
Dr Sunil Kumar	Mass Communication	8948732223
Dr. Manish Kumar Gupta	Biotechnology	9307267812
Dr. S.P. Tiwari	Microbiology	9450776895
Dr. Sudhanshu Yadav	Biochemistry	9451335741

Dr. Sudhir Upadhyay	Environmental Science	7905045512
Prof. Ajay Pratap Singh	Applied Psychology	9451733733
Dr. Manoj Pandey	Applied Psychology	7007978543
Dr. P.K. Kaushik	Admission Cell	9415174240
Mr. Syed Mohd. Imam	Admission Cell	7897432149
Mr. Lal Bhadur	Boys Hostel Representative	7905065547
Mr. MohindarPal	Girls Hostel Representative	9889463488

Syllabus of Entrance test and other related information:

- The questions in the admission Test shall be printed on the answer-booklet issued to the candidates at the commencement of the PUCAT-2019, and the answers thereto shall be entered in the OMR sheet.
- For each course question paper shall be Multiple-choice type Questions.
- There will be no negative marking.

Schedule of Examination

Date	Paper	Duration	Shift
11 th June, 2019	B. Com (Hons) M. Sc. (Physics, Chemistry, Mathematics, Applied Geology)	9.00 AM-11.00 AM	I
	Integrated BALLB MCA	12.00 AM-2.00 PM	II
	M. Sc (Biotechnology, Biochemistry, Microbiology, Environmental Science)	3.00 PM-5.00 PM	III
12 th June, 2019	MA (Mass Communication)	9.00 AM-11.00 AM	I
	MA, Msc. (Applied Psychology)	12.00 PM-2.00 PM	II
	MBA, MBA (E-Com.), MBA (Agri-Business), MBA (Business Economics), MBA (Finance & Control), MBA (Human Resource Development)	3.00 PM-5.00 PM	III

Direct admissions are invited for BCA, MA (Mathematics).

Candidates have to apply through online mode.

B. Com. (Hons.)

The question paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hours

A.	Mathematics Upto 10 th Standard	25 Questions
B.	Reasoning	25 Questions
C.	Current Affairs	50 Questions

BA LLB Integrated Programme

The admission test shall be of duration **Two hours** and shall comprise of one Paper with a maximum of **200 marks**. The paper shall be as follows:

A.	Language Comprehension	60 marks
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	(i) Hindi-10 questions (ii) English-20 questions	
B.	(i) Reasoning, Mental Ability-20 questions (ii) Legal Aptitude-20 questions	80 marks
C.	General Awareness and Current Affairs-30 questions	60 marks
	Total – 100 (Multiple Choice Questions)	200 Marks

Important: The paper of the admission Test shall have emphasis on familiarity with legal and constitutional matters.

Management Courses

Common Question paper will be for admission test in **MBA, MBA (E-Com.), MBA (Agri-Business), MBA (Business Economics), MBA (Finance & Control), MBA (Human Resource Development)**

The Question Paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hrs

A.	Mathematics Upto 10 th Standard	20 Questions
B.	Reasoning	20 Questions
C.	Current Affairs	10 Questions
D.	General Management	50 Questions

MA in Mass Communication

The Question Paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hrs

A.	Journalism (BA Level Purvanchal University Syllabus)	20 Questions
B.	General Studies	20 Questions
C.	Reasoning	20 Questions
D.	General Hindi & General English	20 Questions
E.	Indian Constitution, Ancient Indian History, Indian Economy, General Geography.	20 Questions

MA in Applied Psychology

The Question Paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hrs

A.	Reasoning	20 Questions
B.	Arithmetic	20 Questions
C.	General Studies	20 Questions
D.	General English Grammar	20 Questions
E.	Psychology (Fundamental of Psychology and Human Brain Physiology)	20 Questions

Faculty of Science

Common Question paper will be for admission test in **M.Sc. Biotechnology, M.Sc. Microbiology, M.Sc. Biochemistry and M.Sc. Environmental Sciences.**

The Question Paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hrs

A.	General Science, General Knowledge, Reasoning, General Mathematics	25 Questions
B.	Zoology (from B.Sc. syllabus of VBS Purvanchal Univ., Jaunpur)	25 Questions
C.	Botany (from B.Sc. syllabus of VBS Purvanchal Univ., Jaunpur)	25 Questions
D.	Chemistry (from B.Sc. syllabus of VBS Purvanchal Univ., Jaunpur)	25 Questions

MCA

The Question Paper will contain 100 questions (Multiple Choice Questions).

Duration: 2 Hrs

A.	Mathematics	30 Questions
B.	Analytical Ability & Logical Reasoning	30 Questions
C.	Computer Awareness	20 Questions
D.	General English	20 Questions

Syllabus

MATHEMATICS

- **Set Theory:** Concept of sets – Union, Intersection, Cardinality, Elementary counting; permutations and combinations.
- **Probability and Statistics:** Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, measures of central tendencies and dispersions.
- **Algebra:** Fundamental operations in algebra, expansions, factorization, simultaneous linear /quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, determinants and matrices.
- **Trigonometry:** Simple identities, trigonometric equations properties of triangles, solution of triangles, heights and distances, general solutions of trigonometric equations.

ANALYTICAL ABILITY & LOGICAL REASONING:

The questions in this section will cover logical situation and questions based on the facts given in the passage.

COMPUTER AWARENESS:

- **Computer Basics:** Organization of a computer, Central Processing Unit (CPU), structure of instructions in CPU, input/output devices, computer memory, and back-up devices.
- **Data Representation:** Representation of characters, integers and fractions, binary and hexadecimal representations, binary arithmetic: addition, subtraction, multiplication, division, simple

arithmetic and two's complement arithmetic, floating point representation of numbers, Boolean algebra, truth tables, Venn diagrams.

GENERAL ENGLISH: Questions in this section will be designed to test the candidates' general understanding of the English language. There will be questions on the following topics: Comprehension, vocabulary, Basic English Grammar (like usage of correct forms of verbs, prepositions and articles), word power, synonyms and antonyms, meaning of words and phrases, technical writing.

Prof. Rajendra Singh (Rajju Bhaiya) Institute of Physical Sciences for Study & Research

Instructions for admission test in M.Sc. (Physics), M.Sc. (Mathematics), M.Sc. (Chemistry) and M.Sc. (Applied Geology)

1. **The Duration** of the examination will be two hours and Maximum marks will be 200.
2. Common Question paper will be for admission test in **M.Sc. (Physics), M.Sc. (Mathematics), M.Sc. (Chemistry) and M.Sc. (Applied Geology)**.
3. **The question paper will contain six sections: A (Physics), B (Mathematics), C (Chemistry), D (Zoology), E (Botany), F (Geology).**
4. **Each section will have 50 questions (Multiple Choice). Candidate has to attempt any two sections** from the subjects which were in final year of his/her qualifying degree (UG) programme.

SYLLABUS of Section A: Physics

The section will contain 50 questions (Multiple Choice)

Mechanics: Vectors, Gradients, Divergence and curl; Gauss, Stoke's & Green's Theorems, Vectors Identities. Moment of inertia, Two particle problem reduced mass, Kepler's law, Strain and stress, Elastic moduli and relations between them, Torsion of cylinders, Bending of beams, Internal energy of a strained body. Michelson Morley experiments, Postulates of special theory of relativity, Lorentz transformations, Length contraction. Time dilation, Simultaneity in relativity theory.

Waves and Oscillations: Simple Harmonic motion, Damped Harmonic motion and Forced oscillation in mechanical & Electrical system. Resonance, sharpness of resonance. Mechanical & Electrical impedances. Ultrasonics: Production, Properties and application.

Electricity and Semiconductor Electronics: Electric field due to a dipole, polar and nonpolar dielectric materials. Polarization and displacement. Electronic, atomic, ionic and Orientation polarization, Balance and sensitivity conditions for AC Bridges. Andersons, Wien's and Robinson's Bridges. Circuit parameter, Kirchoff's law, Network's theorem, "Norton's theorem, Thevenin's theorem and Maximum power transfer theorem". Magnetic field, Rectifier Filtering by RC and LC Circuit, Regulation: Conduction in Solid: Conductor, insulator, Semiconductor, intrinsic and extrinsic semiconductor, Conductivity and Mobility. Diode Characteristics, Depletion region, break down voltage. Forward and Reverse Biasing, Zener diode: its Characteristics. NPN and PNP transistor action, its configuration, Hybrid parameter and equivalent circuit RC coupled Amplifier. Principle of feedback, Barkhausen criteria for sustained oscillation, Circuit of Hartley and Colpits Oscillator.

Thermal Physics: Thermodynamics Systems, Macroscopic and Microscopic Variables, Thermodynamical Equilibrium, Zeroth law of thermodynamics and concept of Temperature. First

law of Thermodynamics. Carnot Engine and Refrigerator, , Carnot's Theorem. Clausius-Clapeyron's equation, Clausius theorem, Clausius inequality, Entropy, Second Law of thermodynamics. Maxwell's equation, Joule-Thomson effect, Inversion Temperature. Ehrenfest's equations. Maxwell-Boltzmann Law of distribution, Evaluation of R.M.S. Velocity, average and most probable speeds. Radiation as electromagnetic Waves, Emissive and absorptive powers, Black-body radiation, Stefan-Boltzmann Law, Solar constant and temperature of sun, Temperature of Non-black Bodies, Distribution of energy in the spectrum of black body radiation, Adiabatic expansion of black-body radiation, Law, Wein's displacement law, Wein's formula, Rayleigh-Jeans' law, Planck's law.

Optics: Conditions for observing interference, Interference in Michelson interferometer, thin films, Newton's Rings. Temporal and Spatial Coherence. Stimulated emission, Basic ideas about laser emission, Ruby and He-Ne laser. Fresnel diffraction by straight edge and Fraunhofer's diffraction by single slit and double slit. Theory of plane grating. Rayleigh's criterion of resolution for telescope and grating. Polarization by reflection and refraction Double refraction. Half and quarter wave plates. Production of elliptically and circularly polarized light. Babinet compensator, Nicol Prism. Optical activity. Fresnel's theory of optical rotation. Specific rotation, Biquartz and Laurent's half-shade polarimeters.

Atomic and Nuclear Physics: Bohr model and the spectra of hydrogen atoms, Frank-Hertz experiment. Characteristic and continuous X-rays, Moseley's law, Bragg's Law. Space Quantization, Vector atom model and quantum Numbers, Magnetic moment of electrons Larmor's Precession, Electron Spin, Stern-Gerlach experiment, Pauli's exclusion principle Zeeman effect, Raman effect. Particle nature of radiation, Photoelectric effect and Compton Effect. Wave nature of particles. Natural radioactivity, Law of radioactive disintegration, Detection of radiation, GM Counter and Bubble Chamber Scintillation Counter. Kinematics of nuclear reactions, Artificial nuclear transmutation, Liquid drop model and the semiempirical mass formula, Elementary theory of α - decay, β -Decay and gamma decay. Classification of Elementary Particles, Leptons, mesons and baryons and their quantum numbers, conservation Laws. Relativistic addition of velocities; variation of mass with velocity, Mass energy relation.

Quantum Mechanics: De-Broglie Waves, Davission-Germer Experiment, Wave Packets, Phase velocity and group velocity, Heisenberg's Uncertainty Principle, One dimensional Schrödinger's wave Equation. Observable and Operators, Eigen values and Eigen functions, orthonormality and completeness. Dirac Delta function. Separation of variables in Time-Dependent Schrödinger Equation. Density of state, one-dimensional Potential Barrier problems. Tunnelling through square well potential, One-dimensional Harmonic Oscillator.

Statistical Mechanics and Solid State Physics: Microscopic and Macroscopic systems, Liouville theorem and its consequences, Statistical ensembles, Postulates of quantum statistical mechanics, Crystalline amorphous and glassy state of solids, Crystal lattices, Primitive lattice cell, Miller indices, interplaner spacing, Bravais lattices, Crystal structures, Reciprocal lattices of sc, bcc, fcc diamond and hcp. Bragg's law. Free electron gas in one dimension: Energy levels and density of states, Fermi Energy, Electrical conductivity, Hall Effect. Band Theory of solids: Energy Bands; Kronig-Penny model in one dimension, Energy gap, Distinction between metal, semi-conductor and insulator, Fermi energy level.

Basic Digital Electronics: Semiconductor, BJT, Field effect transistor, MOSFET, enhancement and depletion modes, their representations, the MOS switch. Logic Circuits. AND, OR, NOT, NAND and Ex-OR operation, truth tables, their representations, Venn diagrams.

Electromagnetic theory: Electrostatics potential due to a charge distribution, Electromagnetic waves: Maxwell's Equation, pointing vector, E.M. Waves and its propagation in

free space. Poynting's Theorem, Plane wave solution of Maxwell's equations in source free space and simple dielectrics, skin depth.

SYLLABUS of Section B (MATHEMATICS)

The section will contain 50 questions (Multiple Choice)

Conic sections and related results. Straight lines and planes using vector technique, Spheres, Cones, Cylinders. Sets, Relations, Functions, real numbers and their properties. Sequences and Series of real numbers.

Ordinary differential equations of first and second order and the theories of their solutions.

Origin of first order partial differential equations (PDE), Lagrange's solution, Solutions of partial differential equations of the second order with constant coefficients.

Vector Differentiation, Gradient, Divergence and Curl, Vector Integration (Line, surface and volume integrals), Theorems of Gauss, Green, Stokes and related problems.

Limit, Continuity and differentiability of functions of single variable, Uniform continuity, boundedness theorem, Intermediate value theorems, Indeterminate forms, Successive differentiation, Maclaurin's and Taylor's series, Rolle's, Lagrange and Cauchy Mean value theorems, Asymptotes, Curvature, Envelopes and evolutes, concavity and convexity, Points of inflexion, Riemann integrals and their properties, Improper integrals.

Vector spaces, Subspaces, Basis and dimension of a vector space, Quotient spaces, Linear transformations, Rank- nullity theorem and its applications, Rank of a Matrix, Adjoint of a matrix, Determinant of a matrix and its properties, Consistency of a system of linear equations, Eigen values, Eigen vectors, Cayley-Hamilton theorem, Diagonalization of a matrix and its characterizations.

Moment of inertia, product of inertia, the general equation of motion (D'Alembert's principle).

Virtual work, Stable and Unstable equilibrium, Common Catenary.

Radial and transversal, Tangential and normal components of Velocity and acceleration, Simple Harmonic motion, Motion under other law of forces.

Groups, Subgroups, Cyclic groups, Normal subgroups, Quotient groups, Lagrange's theorem, Isomorphism, Permutation groups, Cayley's theorem, Fermat's and Euler's theorems, Euler's phi function and its properties, Rings, ideals, Integral domains and fields.

Analytic functions, Cauchy- Riemann equations, Harmonic functions, complex integration, Cauchy's integral formula, Liouville's theorem, Power series and its radius of convergence, Taylor and Laurent series, Singularities and their classification, Residues.

Partial derivatives, directional derivatives, continuity and differentiability of functions of several variables and properties, Taylor's theorems, maxima and minima for real valued functions of several variables, Saddle points, Jacobian matrix and Determinants, Inverse function theorem.

Numerical solutions of algebraic and transcendental equations, Bisection, Regula falsi and Newton-Raphson's method, Interpolation, Finite differences and interpolation with equal and unequal intervals, Numerical differentiation and integration, Newton Cotes quadrature formula, Trapezoidal, Simpson's one-third and Simpson's third-eight rules, Euler's, Taylor series and Improved Euler's methods, Runge-Kutta method, Gauss Elimination method, LU- factorization method, Cholesky's method, Gauss-Jacobi and Gauss-Seidel iteration methods.

Fourier series and its properties, Fourier and Laplace transforms, Metric spaces: definitions and examples, Open and closed sets, Interior, exterior and boundary points, Limit point, Sequences and their convergence in a metric space.

SYLLABUS of Section C: Chemistry

The section will contain 50 questions (Multiple Choice)

Atomic Structure and Quantum Mechanics: de-Broglie equation, Heisenberg uncertainty principle, Schrödinger wave equation, quantum numbers, Aufbau and Pauli exclusion principles, Hund's multiplicity rule.

Periodic Properties: Atomic and ionic radii, ionization energy, electron affinity and electronegativity definition, trends in periodic table and applications in predicting and explaining the chemical behavior.

Chemical Bonding: Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory. Molecular orbital theory (MOT).

Ionic Solid: Ionic structures, radius ratio effect and coordination number, lattice defects, semiconductors, lattice energy and Born-Haber cycle, Fajan's rule. Derivation of Bragg equation.

s-Block Elements: Comparative study, diagonal relationship, salient features of hydrides, solvation and complexation tendencies.

Chemistry of Noble Gases: Chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

p-Block Elements: Comparative study (including diagonal relationship) of groups 13-17 elements, compounds like hydrides, oxides, oxyacids and halides of group 13-16, hydrides of boron-diborane and higher boranes, borazine,

d-Block Elements: Chemistry of Elements of First, second and third Transition Series. Characteristic properties of d-block elements in respect of ionic radii, oxidation states, magnetic behavior.

Coordination Compounds: Werner's coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Crystal field theory (CFT).

Chemistry of Lanthanide and Actinides: Electronic configuration, oxidation states, ionic radii and lanthanide contraction, complex formation, oxidation states and magnetic properties.

Spectroscopy: Ultra violet (U.V.) and Infrared (I.R.)

Alkanes, alkenes and alkynes: General synthesis and its chemical reactions.

(i) **Alcohols:** Classification and nomenclature, Monohydric alcohols – nomenclature, methods of formation and chemical reactions. (ii) **Phenols:** Reactions of phenols – electrophilic aromatic substitution, acylation and carboxylation. Reimer-Tiemann reaction.

(i) **Aldehydes and Ketones:** Synthesis of aldehydes and ketones, Aldol, Perkin and Knoevenagel condensations, Wittig reaction. Oxidation of aldehydes and ketones, Cannizzaro reaction, MPV, Clemmensen reduction. (ii) **Carboxylic Acids:** Preparation of carboxylic acids, Reactions of carboxylic acids, Hell-Volhard-Zelinsky reaction.

Heterocyclic Compounds: Preparation and reactions of Pyrrole, thiophene indole, quinoline and isoquinoline.

Arenes and Aromaticity: Aromatic and antiaromatic compounds: Huckel rule.

Alkyl halides: Nomenclature and classes of alkyl halides, methods of formation, chemical reactions, Mechanisms of nucleophilic substitution reactions of alkyl halides, SN2 and SN1 reactions with energy profile diagrams.

Stereochemistry: Cis-trans Isomers, E-Z notation for geometric isomerism, Absolute Configuration: R-S Sequence Rules

Gaseous States: Deviation from ideal behavior, van der Waals equation of state, Critical Phenomena, Molecular velocities: Root mean square, average and most probable velocities,

Solutions: Raoult's and Henry's law, Colligative properties include lowering of vapor pressure, boiling point elevation, freezing point depression, and osmotic pressure.

Chemical Kinetics and Catalysis: Rate of a reaction, factors influencing the rate of a reaction, zero order, first order, second order, pseudo first order

Thermodynamics: Ist and IInd law of thermodynamic, Carnot's cycle and its efficiency, Carnot's theorem, Joule-Thomson coefficient and inversion temperature. Concept of entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, Gibbs and Helmholtz free energy. **Thermochemistry:** Hess's Law of heat summation and its applications, Heat of reaction at constant pressure and at constant volume, Enthalpy of neutralization, Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchhoff's equation.

Chemical Equilibrium: Equilibrium constant and free energy, law of mass action, Le Chatelier's principle.

Electrochemistry: Nernst equation, Relationship between cell potential and Gibbs' energy change, Cell Constant, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law.

SYLLABUS for Section D (ZOOLOGY)

The section will contain 50 questions (Multiple Choice)

Biodiversity; Origin of chordates adaptations; Structure and function of cell and cell division; Chemical constituents of living cells; Enzyme and Vitamins; Metabolism of carbohydrates, protein, lipids and nucleic acids; Physiology with special reference to mammals. Mendelian inheritance and natural selection; Gametogenesis; Ecosystem; Biogeochemical cycles; Population ecology; Pollution and its impact on biosphere and its prevention; Conservation of natural resources; Animal behavior; Probability; Immunology: biotechnology, recombinant DNA technology.

SYLLABUS for Section E (BOTANY)

The section will contain 50 questions (Multiple Choice)

Microorganisms: viruses, bacteria, algae, fungi; Important plant diseases; Bryophytes; Pteridophytes; General characters of Gymnosperms; General characters of Angiosperms-Morphology of root, stem and leaves of Angiosperms; Pollination; Development of male and female gametophytes; Endosperm; Utilization of plants: Medicinal plants; Plants and Environment: atmosphere, water, light, temperature, soil; Ecosystems: abiotic and biotic components; Food chain; Food web; Ecological pyramids; Energy flow and biogeochemical cycles; Red data book and IUCN classification; Cell Biology: Concept of heredity; Mendel's laws of heredity; Mutation; Nucleic acids: DNA and RNA-its structure, types and functions.

SYLLABUS for Section F (Geology)

The section will contain 50 questions (Multiple Choice)

Origin of the solar system and the Earth; Interior of earth; Volcanism and volcanic landforms; Earthquakes; Isostasy; Sea floor spreading; Plate tectonics and continental drift; Weathering and erosion due to wind, glacier, river, sea, and resulting landforms; Dip and Strike; Primary and secondary sedimentary structures; Folds, Faults, Joints, Foliation and Lineation, Unconformities; Stratigraphy horizons of India; Symmetry and forms in common crystals classes, Physical properties of minerals, Mineralogy and optical properties of common rock-forming minerals, Silicate structures; Classification of igneous rocks; Sedimentary rocks and metamorphic rocks, and their texture, and structures; General properties, formation and Indian occurrences of the economic and industrial mineral deposits; Coal and petroleum occurrences in India; Ground water hydrology; Global warming; Pollution: air, water and soil; Engineering properties of rocks; Engineering structures: dams, reservoirs, tunnels.

(Dr. Raj Kumar)
Convener
PUCAT-2019

(Prof. B. B. Tiwari)
CHAIRMAN
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