ELECTRICITY SERVICE COMMISSION
U.P. Power Corporation Limited
(U.P. Government Undertaking)
S.L.D.C.Campus(Near Mantri Awas)
Vibhooti Khand,Phase-II;Gomti Nagar
LUCKNOW-226010

(ADVT. No.: 9/VSA/2016/SANCTIONED/AE)

Online Applications are invited from Eligible Indian Nationals for direct recruitment to the following posts of Assistant Engineer (Trainee) under E&M cadre(Table-1) and Assistant Engineer (Trainee) under Civil cadre (Table-2) against vacancies under Uttar Pradesh Power Corporation Ltd. (UPPCL) and U.P. Power Transmission Corporation Ltd.(TRANSCO) as detailed below. Application received through other modes is not acceptable.

1- Details of Vacancies :

Table -1

POST CADRE	POST NAME	ENGG. CATEGORY	TOTAL	UN-RESERVED	OBC	SC	ST	TO BE POSTED AS*
					(U.P. Domicile Only)			
E&M	Assistant Engineer (Trainee)	Electrical Engineering	161	82	43	33	03	Assistant Engineer (Distribution)
E&M	Assistant Engineer (Trainee)	Computer Science Engineering	48	26	12	10	NIL	Assistant Engineer (IT & Revenue)
E&M	Assistant Engineer (Trainee)	Electronics and Tele-communication Engineering	55	29	14	11	01	Assistant Engineer (Meter)

Table -2

POST CADRE	POST NAME	ENGG. CATEGORY	TOTAL	UN-RESERVED	OBC	SC	ST	TO BE POSTED AS*
					(U.P. Domicile Only)			
Civil	Assistant Engineer (Trainee)	Civil Engineering	06	04	01	01	NIL	Assistant Engineer (Civil)

*The vacancies stated above in Table-1 & Table-2 under various Engineering categories in E&M cadre are to be posted in various disciplines under **UPPCL** and **TRANSCO** as shown above.

Other provisions and instructions required for filling of Online Applications are given as under:

2. Candidates availing the facility of reservation should clearly mention the category applicable. Under any circumstances, change of data will not be allowed after successful submission of Application form. The candidate has to deposit separate application fee and fill another form to affect correction. However submitted application form can be viewed and downloaded/printed. On detection, of incorrect/false information or submission of false/fake documents will lead to cancellation of candidature/appointment at any stage.

3. Pay Scale : Pay Band-3; Rs. 15600-39100 + Grade Pay Rs. 5400/- Dearness and other allowances admissible as per rules of UPPCL.

4. Essential Qualification :

(A) For Assistant Engineer(T) of (E & M)Cadre

(i) Candidates should have sufficient knowledge of Hindi in Devnagri Lipi.

(ii)Electrical Engineering Category: A degree in Electrical Engineering or a mixed discipline(युग्म) degree combined with Electrical Engineering.

(iii) Electronics and Tele-communication Engineering Category:

(iv) Computer Science Engineering Category: A degree in Computer Science Engineering or Information Technology or a mixed discipline (युग्म) degree combined with either Computer Science Engineering or Information Technology.

(B) For Assistant Engineer(T) of (Civil) Cadre

(i) Candidates should have sufficient knowledge of Hindi in Devnagri Lipi.

(ii)A bachelor's degree in Civil Engineering from a University OR Institution established by law in Uttar Pradesh or from any other Institution recognized by State Government or a degree recognized as equivalent thereto by the State Government OR Part-A & B examinations conducted by the Institution of Engineers (India).

Note:-

(i) The above degree must be obtained from a University incorporated by an Act of the Central or State Legislature in India or other Educational Institutions established by an Act of Parliament or declared to be deemed as Universities under Section 3 of the University Grants Commission Act 1956, as a full time regular degree course (OR) passed Section A and B of the Institution Examinations of the Institution of Engineers (India) in relevant discipline as mentioned above.

(ii)Degree/Diploma received through Distance Learning Education will not be eligible in direct recruitment as well as in promotion.

5. Age : Minimum 21 years and maximum 40 years as on 01-07-2016.

Relaxation in upper age limit:

(i)Apprenticeship training under Apprenticeship Act 1961–Actual period of apprenticeship, subject to maximum 12 months.

(ii) OBC (non-creamy layer) /SC/ ST of Uttar Pradesh domicile -5 years.

(iii) Dependents of Freedom Fighter-5 years.

(iv) Physically Handicapped candidates(Disability type-OA/OL/PB/PD only)(40% and above disability)-15 years.

However maximum age of a candidate availing all relaxations shall not exceed 55 years.

6 Reservation : (I) Vertical & Horizontal reservations will be provided to candidates of Uttar Pradesh only as per rules of UP Govt. and duly adopted by UPPCL. (II) Candidates of States/Union Territories other than Uttar Pradesh should apply as General/Unreserved Category candidate.

No Objection Certificate : Candidate who are working with any State Govt./Central Govt./Semi-Govt./ Govt. Undertaking organization ,shall have to submit 'NOC' from their present Employer at the time of Joining.

8. Examination center & Selection Process : Selection Process will be based on Computer Based Test and interview. Computer Based Test(CBT) will be held at major cities of Uttar Pradesh .i.e. Allahabad, Varanasi, Gorakhpur, Agra, Kanpur, Bareilly, Lucknow, Ghaziabad, Meerut cities etc.. Electricity Service Commission; however have the right to cancel any of the Examination City/ Center and/or add some other cities/centers depending upon the response, administrative feasibility, or any force-majeure conditions etc.) The test shall comprise of total 200 questions, out of which 150 questions shall be from the Bachelor Engineering level, 20 questions of General Knowledge/Awareness, 20 questions of Reasoning and 10 questions of General Hindi. Each correct answer shall carry one mark each and each wrong answer shall carry negative mark of 0.25. Interview will be conducted at Lucknow only. Candidates who obtain less than 30 % marks will be rejected for further process of selection. Maximum numbers of candidates to be shortlisted for interview will be equal to 3 times the number of vacancies. Candidates having equal marks as that of last shortlisted Candidate will also be called for interview. If a candidate is shortlisted for interview, then appearing in interview is compulsory, failing which his/her candidature will be treated as cancelled.The SELECT list shall be prepared on the basis of the combined marks obtained in the CBT and interview.

* CANDIDATE MUST CARRY (i)ADMIT CARD,(ii) PASSPORT SIZE PHOTOGAPH (SAME AS IN THE APPLICATION FORM)AND(iii) A VALID PHOTO IDENTITY CARD SUCH AS PASSPORT, DRIVING LICENCE, VOTER ID, AADHAR CARD, PAN CARD OR ANY OTHER PHOTO IDENTITY PROOF RECOGNISED BY U.P. GOVT., WHILE REPORTING FOR CBT/INTERVIEW.
* CANDIDATES ARE REQUIRED TO MAINTAIN THEIR UNIQUE E-MAIL ADDRESS AND MOBILE NUMBER TILL FINAL RRESULT IS DECLARED.
* IF AT ANY STAGE, IT IS FOUND THAT ANY INFORMATION FURNISHED IN THE ONLINE APPLICATION IS FALSE / INCORRECT OR THE CANDIDATE DOES NOT SATISFY THE ELIGIBILITY CRITERIA FOR THE POST APPLIED, THE CANDIDATURE WILL BE TREATED AS CANCELLED.
* Candidates having undergone apprenticeship training under Apprenticeship Act-1961, will be given age relaxation and preference as per order of Hon'ble Supreme Court, in case, all other requisite parameters being the same.

9. Syllabus for various disciplines: The syllabus for various disciplines will be of Graduate Enginnering level. However, main contents of the syllabus are provided at Annexure-A.

10. Training: The selected candidate has to undergo a training programme, for a period as decided by UPPCL. On successful completion of the training, the candidate shall be considered for absorption as per existing rules of UPPCL.

11. Transparency: For the complete transparency of the held CBT, the Electricity Service Commission shall arrange to display the answer-key for 3 days on the official website of UPPCL or provide a link on their registered E-mail, after two days of the examination or provide a portal, from where a candidate can download his answer-sheet. The candidate can lodge their protest online, if any, along with proper proof within 3 days from the last date of display of answer-key. Electricity Service Commission will refer all the objections received online , to a panel of experts, whose decision shall be final and thereafter result will be processed accordingly. After the expiry of this dead-line, further objections will not be entertained.

12. Application Processing Fee (NON-REFUNDABLE):-

1.	SC (Domicile Of U.P.) CATEGORY/ST (Domicile Of U.P.) CATEGORY	Rs. 700/-
2.	GENERAL CATEGORY/OBC(Non Creamy Layer)/DFF	Rs. 1000/-
3.	PH(OA/OL/PB/PD) Only-PROCESSING CHARGES	Rs. 10/-
4.	CANDIDATES OF STATES/UNION TERITORY OTHER THAN UTTAR PRADESH	Rs. 1000/-

NOTE:-

(a) Application Processing Fee can be paid through ATM cum Debit Card/Credit Card/SBI Net banking/Payment gateway OR Bank Challan Form (Payable at State Bank of India only). (b) Bank charges, in addition to the Application Processing Fee shall be paid by the candidate. (c) Application processing fee, once paid will neither be refunded /transferred nor can be held in reserve for any other future selection process.

13. Character : Candidate will have to produce character certificate issued from the Head of the last Institute attended and also from two responsible/ respectable persons who should not be his/her relatives at the time of joining.

14. Marital Status : Any married male/female candidate having more than one wife/husband alive and female candidate who is married to a person who has already one or more living wife, are NOT ELIGIBLE for selection.

15. How to apply : **Application Form, Payment mode and other general details are available at** UPPCL official website www.uppcl.org Candidates are advised to Login to the website and follow the instructions carefully given therein step by step, for completing and submission of Application Form.

16. Submission of documents : All relevant original documents, such as, Caste certificate, domicile certificates, date of birth certificate, Technical essential qualification certificate/final marks sheet, certificate of dependent of freedom fighter (if applicable),apprentice certificate, certificate of physically handicapped issued by State Medical Board with percentage of disability shall have to be produced in original for verification alongwith a self attested copy of each document at the time of interview . Failure of producing these qualifying documents at the time of interview in original will result in automatic rejection of candidature.

17. Secretary, Electricity Service Commission reserves the right to cancel this advertisement at any time without assigning any reason thereof.

18. Jurisdiction : Any dispute arising out of this advertisement shall be subject to the jurisdiction of the Courts at U.P. only.

19. Disclaimer:

TERMS AND CONDITIONS GIVEN IN THE ADVERTISEMENT ARE GUIDELINES ONLY. IN CASE OF ANY AMBIGUITY, THE EXISTING POLICIES, RULES AND REGULATIONS OF UPPCL WILL BE FINAL.

IMPORTANT DATES

Payment of Application Processing Fees	11.10.2016 to 30.10.2016
Completion of Application Form	11.10.2016 to 30.10.2016
Tentative date of examination(CBT)	Between 11 -14 November'2016

SUPPORT HELP DESK

Helpdesk Email address	helpdesk.uppclrec9.2016@gmail.com

Secretary
Electricity Service Commission

No. 1164 /ESC/9-VSA-2016/Sanctioned/AE Dated: October 09, 2016

Electrical Engineering Syllabus

SECTION-A

GENERAL HINDI:- In General Hindi Section, Questions will designed to check the Understanding & Perfect use of Hindi Words under Hindi Language. Paper will be of High School Level. Questions will be asked from:-

1: Unseen Passage, 2: Use of Symbols, 3: Antonyms, 4: Phrases and Idioms, 5: Synonyms, 6: Sentence Correction.

GENERAL ENGLISH): Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions.

GENERAL AWARENESS, APTITUDE AND REASONING:

Question will be asked from Indian History, Geography, Indian Economy, Sports,etc.; critical logical reasoning and verbal and non-verbal deduction.

SECTION-B

1. EM Theory Electric and magnetic fields:Gauss's Law and Amperes Law. Fields in dielectrics, conductors and magnetic materials. Maxwell's equations. Time varying fields. Plane-Wave propagating in dielectric and conducting media. Transmission lines.

2. Electrical Materials:Band Theory, Conductors, Semi-conductors and Insulators. Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ferro and ferri magnetism. Ceramics, Properties and applications. Hall effect and its applications. Special semi conductors.

3.Electrical Circuits:Circuits elements. Kirchoff's Laws. Mesh and nodal analysis. Network Theorems and applications. Natural response and forced response. Transient response and steady state response for arbitrary inputs. Properties of networks in terms of poles and zeros. Transfer function. Resonant circuits. Three phase circuits .Two -port networks. Elements of two-element network synthesis.

4. Measurements and Instrumentation:Units and Standards. Error analysis, measurement of current, Voltage, power, Power-factor and energy. Indicating instruments. Measurement of resistance, inductance, Capacitance and frequency. Bridge measurements . Electronic measuring instruments. Instrument transformers, Digital voltmeters and multimeters, phase, time and frequency measurement, Q-meters, Transducers and their applications to the measurement of nonelectrical quantities like temperature, pressure, flow-rate displacement, acceleration, noise level etc., Data acquisition systems. A/D and D/A converters.

5. Electrical Machines and Power Transformers:Magnetic Circuits - Analysis and Design of Power transformers. Construction and testing. Equivalent circuits. Losses and efficiency. Regulation. Auto-transformer, 3-phase transformer. Parallel operation. Basic concepts in rotating machines. EMF, torque, basic machine types. Construction and operation, leakage losses and efficiency. D.C. Machines. Construction, Excitation methods. Circuit models. Armature reaction and commutation. Characteristics and performance analysis. Generators and motors. Starting and speed control. Testing, Losses and efficiency. Synchronous Machines. Construction. Circuit model. Operating characteristics and performance analysis. Synchronous reactance. Efficiency. Voltage regulation. Salient-pole machine, Parallel operation. Hunting. Short circuit transients. Induction Machines. Construction. Principle of operation. Rotating fields. Characteristics and performance analysis. Determination of circuit model. Circle diagram. Starting and speed control. Fractional KW motors. Single-phase synchronous and induction motors.

6. Power systems:Types of Power Stations, Hydro, Thermal and Nuclear Stations. Pumped storage plants. Economics and operating factors. Power transmission lines-Modeling and performance characteristics. Voltage control. cable performance, Insulation; corona and radio interference; distribution systems; bus impedance and admittance matrices; power factor correction; ; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; Load flow studies. Optimal power system operation. Load frequency control. Symmetrical short circuit analysis. Z-Bus formulation. Symmetrical Components. Per Unit representation. Fault analysis. Transient and steady-state stability of power systems. swing curves and equal area criterion. Power system Transients. Power system Protection Circuit breakers. Relays. HVDC transmission and FACTS concepts.

Power system protection: Switch gear methods of Arc Extinction, Restrilling and recovery voltage, testing of circuit breakers, Protective relays, protective schemes for power system equipment C.T. and P.T. surges in transmission lines and protection. Analog and Digital Computation.

7.Communication Systems: Types of modulation; AM, FM and PM. Demodulators. Noise and bandwidth considerations. Digital communication systems. Pulse code modulation and demodulation. Elements of sound and vision broadcasting. Carrier communication. Frequency division and time division multiplexing, Telemetry system in power engineering.

8.Power Electronics: Power Semiconductor devices. Thyristor, Power transistor, GTOs and MOSFETs, Characteristics and operation. AC to DC Converters, 1-phase and 3-phase DC to DC Converters, AC regulators, Thyristor controlled reactors; switched capacitor networks. Inverters; single-phase and 3-phase. Pulse width modulation. Sinusoidal modulation with uniform sampling. Switched mode power supplies.

Electronics & Telecommunication Engineering Syllabus

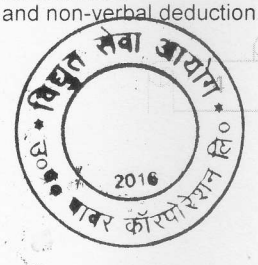
SECTION-A

GENERAL HINDI:- In General Hindi Section, Questions will designed to check the Understanding & Perfect use of Hindi Words under Hindi Language. Paper will be of High School Level. Questions will be asked from:-

1: Unseen Passage, 2: Use of Symbols, 3: Antonyms, 4: Phrases and Idioms, 5: Synonyms, 6: Sentence Correction.

GENERAL ENGLISH): Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions.

GENERAL AWARENESS, APTITUDE AND REASONING: Question will be asked from Indian History, Geography, Indian Economy, Sports,etc.; critical logical reasoning and verbal and non-verbal deduction.



SECTION-B

1.Materials and Components:Structure and properties of Electrical Engineering materials; Conductors, Semiconductors and Insulators, magnetic, Ferroelectric, Piezoelectric, Ceramic, Optical and Super-conducting materials. Passive components and characteristics Resistors, Capacitors and Inductors; Ferrities, Quartz crystal Ceramic resonators, Electromagnetic an Electromechanical components.

2.Physical Electronics:Electron Devices and ICs:Electrons and holes in semiconductors, Carrier Statistics, Mechanism of current flow in a semiconductor, Hall effect; Junction theory; Different types of diodes and their characteristics; Bipolar Junction transistor; Field effect transistors; Power switching devices like SCRs, CTOs, power MOSFETs; Basics of ICs - bipolar, MOS and CMOS types; basic of Opto Electronics.

3.Signals and Systems:Classification of signals and systems: System modelling in terms of differential and difference equations; State variable representation; Fourier series; Fourier representation; Fourier series; Fourier transforms and their application to system analysis; Laplace transforms and their application to system analysis; Convolution and superposition integrals and their applications; Z-transforms and their applications to the analysis and characterisation of discrete time systems; Random signals and probability, Correlation functions; Spectral density; Response of linear system to random inputs.

4.Network theory:Network analysis techniques; Network theorems, transient response, steady state sinusoidal response; Network graphs and their applications in network analysis; Tellegen's theorem. Two port networks; Z, Y, h and transmission parameters. Combination of two ports, analysis of common two ports. Network functions : parts of network functions, obtaining a network function from a given part. Transmission criteria : delay and rise time, Elmore's and other definitions effect of cascading. Elements of network synthesis.

5.Electromagnetic Theory:Analysis of electrostatic and magnetostatic fields; Laplace's and Piossons's equations; Boundary value problems and their solutions; Maxwell's equations; application to wave propagation in bounded and unbounded media; Transmission lines : basic theory, standing waves, matching applications, misconstrue lines; Basics of wave guides and resonators; Elements of antenna theory.

6.Electronic Measurements and instrumentation: Basic concepts, standards and error analysis; Measurements of basic electrical quantities and parameters; Electronic measuring instruments and their principles of working : analog and digital, comparison, characteristics, application. Transducers; Electronic measurements of non electrical quantities like temperature, pressure, humidity etc; basics of telemetry for industrial use.

7.Analog Electronic Circuits:Transistor biasing and stabilization. Small signal analysis. Power amplifiers. Frequency response. Wide banding techniques. Feedback amplifiers. Tuned amplifiers. Oscillators. Rectifiers and power supplies. Op Amp PLL, other linear integrated circuits and applications. Pulse shaping circuits and waveform generators.

8. Digital Electronic Circuits:Transistor as a switching element; Boolean algebra, simplification of Boolean functions, Karnaguh map and applications; IC Logic gates and their characteristics; IC logic families : DTL, TTL, ECL, NMOS, PMOS and CMOS gates and their comparison; Combinational logic Circuits; Half adder, Full adder; Digital comparator; Multiplexer Demultiplexer; ROM and their applications. Flip flops. R-S, J.K, D and T flip-flops; Different types of counters and registers Waveform generators. A/D and D/A converters. Semiconductor memories.

9. Communication Systems:Basic information theory; Modulation and detection in analogue and digital systems; Sampling and data reconstructions; Quantization & coding; Time division and frequency division multiplexing; Equalization; Optical Communication : in free space & fiber optic; Propagation of signals oat HF, VHF, UHF and microwave frequency; Satellite Communication.

10. Microwave Engineering:Microwave Tubes and solid state devices, Microwave generation and amplifiers, Waveguides and other Microwave Components and Circuits, Misconstrue circuits, Microwave Antennas, Microwave Measurements, Masers, lasers; Microwave propagation. Microwave Communication Systems terrestrial and Satellite base

Civil Engineering Syllabus

SECTION-A

GENERAL HINDI:- In General Hindi Section, Questions will designed to check the Understanding & Perfect use of Hindi Words under Hindi Language. Paper will be of High School Level. Questions will be asked from:-

1: Unseen Passage, 2: Use of Symbols, 3: Antonyms, 4: Phrases and Idioms, 5: Synonyms, 6: Sentence Correction.

GENERAL ENGLISH): Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions.

GENERAL AWARENESS, APTITUDE AND REASONING:

Question will be asked from Indian History, Geography, Indian Economy, Sports,etc.; critical logical reasoning and verbal and non-verbal deduction.

SECTION-B

1. Engineering Mechanics, Strength of Materials and Structural Analysis:

1.1 Engineering Mechanics:

Units and Dimensions, SI Units, Vectors, Concept of Force, Concept of particle and rigid body. Concurrent, Non Concurrent and parallel forces in a plane, moment of force, free body diagram, conditions of equilibrium, Principle of virtual work, equivalent force system.First and Second Moment of area, Mass moment of Inertia. Static Friction.

Kinematics and Kinetics: Kinematics in Cartesian Co-ordinates, motion under uniform and nonuniform acceleration, motion under gravity. Kinetics of particle: Momentum and Energy principles, collision of elastic bodies, rotation of rigid bodies.

1.2 Strength of Materials:

Simple Stress and Strain, Elastic constants, axially loaded compression members, Shear force and bending moment, theory of simple bending, and Shear Stress distribution across cross sections, Beams of uniform strength.
Deflection of beams: Macaulay's method, Mohr's Moment area method, Conjugate beam method, unit load method. Torsion of Shafts, Elastic stability of columns, Euler's Rankine's and Secant formulae.
1.3 Structural Analysis:Castiglianio's theorems I and II, unit load method of consistent deformation applied to beams and pin jointed trusses. Slope-deflection, moment distribution.
Rolling loads and Influences lines: Influences lines for Shear Force and Bending moment at a section of beam. Criteria for maximum shear force and bending Moment in beams traversed by a system of moving loads. Influences lines for simply supported plane pin jointed trusses.
Arches: Three hinged, two hinged and fixed arches, rib shortening and temperature effects.
Matrix methods of analysis: Force method and displacement method of analysis of indeterminate beams and rigid frames.
Plastic Analysis of beams and frames: Theory of plastic bending, plastic analysis, statical method, Mechanism method.
Unsymmetrical bending: Moment of inertia, product of inertia, position of Neutral Axis and Principle axes, calculation of bending stresses.

2. Design of Structures: Steel, Concrete and Masonry Structures:

2.1 Structural Steel Design:Structural Steel: Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression member, beams of built up section, riveted and welded plate girders, gantry girders, stancheons with battens and lacings.
2.2 Design of Concrete and Masonry Structures: Concept of mix design.
Reinforced Concrete: Working Stress and Limit State method of design–Recommendations of I.S. codes Design of one way and two way slabs, stair-case slabs, simple and continuous beams of rectangular, T and L sections. Compression members under direct load with or without eccentricity.Cantilever and Counter fort type retaining walls.
Water tanks: Design requirements for Rectangular and circular tanks resting on ground.
Prestressed concrete: Methods and systems of prestressing, anchorages, Analysis and design of sections for flexure based on working stress, loss of prestress.
Design of brick masonry as per I.S. Codes.

3. Fluid Mechanics, Open Channel Flow and Hydraulic Machines:

3.1 Fluid Mechanics: Fluid properties and their role in fluid motion, fluid statics including forces acting on plane and curved surfaces.
Kinematics and Dynamics of Fluid flow: Velocity and accelerations, stream lines, equation of continuity, irrotational and rotational flow, velocity potential and stream functions. Continuity, momentum and energy equation, Navier-Stokes equation, Euler's equation of motion, application to fluid flow problems, pipe flow, sluice gates, weirs.
3.2 Dimensional Analysis and Similitude: Buckingham's Pi-theorem, dimensionless parameters.
3.3 Laminar Flow:Laminar flow between parallel, stationary and moving plates, flow through tube.
3.4 Boundary layer: Laminar and turbulent boundary layer on a flat plate, laminar sub layer, smooth and rough boundaries, drag and lift. Turbulent flow through pipes: Characteristics of turbulent flow, velocity distribution and variation of pipe friction factor, hydraulic grade line and total energy line.
3.5 Open channel flow:Uniform and non-uniform flows, momentum and energy correction factors, specific energy and specific force, critical depth, rapidly varied flow, hydraulic jump, gradually varied flow, classification of surface profiles, control section, step method of integration of varied flow equation.
3.6 Hydraulic Machines and Hydropower:Hydraulic turbines, types classification, Choice of turbines, performance parameters, controls, characteristics, specific speed. Principles of hydropower development.

4. Geotechnical Engineering:

Soil Type and structure – gradation and particle size distribution – consistency limits.
Water in soil – capillary and structural – effective stress and pore water pressure – permeability concept – field and laboratory determination of permeability – Seepage pressure – quick sand conditions – Shear strength determination – Mohr Coulomb concept.Compaction of soil – Laboratory and field tests.Compressibility and consolidation concept – consolidation theory – consolidation settlement analysis.Earth pressure theory and analysis for retaining walls, Application for sheet piles and Braced excavation.Bearing capacity of soil – approaches for analysis – Field tests – settlement analysis – stability of slope of earth walk.Subsurface exploration of soils – methods.Foundation – Type and selection criteria for foundation of structures – Design criteria for foundation – Analysis of distribution of stress for footings and pile – pile group action-pile load test. Ground improvement techniques.

5. Construction Technology, Equipment, Planning and Management:

5.1 Construction Technology:
Engineering Materials:Physical properties of construction materials with respect to their use in construction - Stones, Bricks and Tiles; Lime, Cement, different types of Mortars and Concrete.Specific use of ferro cement, fibre reinforced C.C, High strength concrete.Timber, properties and defects - common preservation treatments.Use and selection of materials for specific use like Low Cost Housing, Mass Housing, High Rise Buildings.
5.2 Construction:
Masonry principles using Brick, stone, Blocks – construction detailing and strength characteristics.Types of plastering, pointing, flooring, roofing and construction features.Common repairs in buildings.Principles of functional planning of building for residents and specific use - Building code provisions.Basic principles of detailed and approximate estimating - specification writing and rate analysis – principles of valuation of real property.Machinery for earthwork, concreting and their specific uses – Factors affecting selection of equipments – operating cost of Equipments.
5.3 Construction Planning and Management:Construction activity – schedules- organization for construction industry – Quality assurance principles.Use of Basic principles of network – analysis in form of CPM and PERT – their use in construction monitoring, Cost optimization and resource allocation.Basic principles of Economic analysis and methods.Project profitability – Basic principles of Boot approach to financial planning – simple toll fixation criterions.

6. Surveying and Transportation Engineering

6.1 Surveying:Common methods and instruments for distance and angle measurement for CE work – their use in plane table, traverse survey, leveling work, triangulation, contouring and topographical map.Basic principles of photogrammetry and remote sensing.
6.2 Railway Engineering:Permanent way – components, types and their functions – Functions and Design constituents of turn and crossings – Necessity of geometric design of track – Design of station and yards.
6.3 Highway Engineering:Principles of Highway alignments – classification and geometrical design elements and standards for Roads.Pavement structure for flexible and rigid pavements - Design principles and methodology of pavements.Typical construction methods and standards of materials for stabilized soil, WBM, Bituminous works and CC roads.Surface and sub-surface drainage

arrangements for roads - culvert structures.Pavement distresses and strengthening by overlays.Traffic surveys and their applications in traffic planning - Typical design features for channelized, intersection, rotary etc – signal designs – standard Traffic signs and markings.

7. Hydrology, Water Resources and Engineering:

7.1 Hydrology:Hydrological cycle, precipitation, evaporation, transpiration, infiltration, overland flow, hydrograph, flood frequency analysis, flood routing through a reservoir, channel flow routing-Muskingam method.

7.2 Ground water flow:Specific yield, storage coefficient, coefficient of permeability, confined and unconfined equifers, aquifers, aquitards, radial flow into a well under confined and unconfined conditions.

7.3 Water Resources Engineering:

Ground and surface water resource, single and multipurpose projects, storage capacity of reservoirs, reservoir losses, reservoir sedimentation.

7.4 Irrigation Engineering:(i) Water requirements of crops: consumptive use, duty and delta, irrigation methods and their efficiencies.(ii) Canals: Distribution systems for canal irrigation, canal capacity, canal losses, alignment of main and distributory canals, most efficient section, lined canals, their design, regime theory, critical shear stress, bed load.(iii) Water logging: causes and control, salinity.(iv) Canal structures: Design of, head regulators, canal falls, aqueducts, metering flumes and canal outlets.(v) Diversion headwork: Principles and design of weirs of permeable and impermeable foundation, Khosla's theory, energy dissipation.(vi) Storage works: Types of dams, design, principles of rigid gravity, stability analysis.(vii) Spillways: Spillway types, energy dissipation.(viii) River training: Objectives of river training, methods of river training.

8. Environmental Engineering:

8.1 Water Supply:Predicting demand for water, impurities, of water and their significance, physical, chemical and bacteriological analysis, waterborne diseases, standards for potable water.

8.2 Intake of water:Water treatment: principles of coagulation, flocculation and sedimentation; slow-; rapid-, pressure-, filters; chlorination, softening, removal of taste, odour and salinity.

8.3 Sewerage systems:Domestic and industrial wastes, storm sewage–separate and combined systems, flow through sewers, design of sewers.

8.4 Sewage characterization:BOD, COD, solids, dissolved oxygen, nitrogen and TOC. Standards of disposal in normal watercourse and on land.

8.5 Sewage treatment:Working principles, units, chambers, sedimentation tanks, trickling filters, oxidation ponds, activated sludge process, septic tank, disposal of sludge, recycling of wastewater.

8.6 Solid waste: Collection and disposal in rural and urban contexts, management of long-term ill effects.

9. Environmental pollution: Sustainable development. Raw wastes and disposal. Environmental impact assessment for thermal power plants, mines, river valley projects. Air pollution. Pollution control acts.

Computer Science - CSE & IT Syllabus

SECTION-A

GENERAL HINDI:- In General Hindi Section, Questions will designed to check the Understanding & Perfect use of Hindi Words under Hindi Language. Paper will be of High School Level. Questions will be asked from:-

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SECTION-B

Computer Science and Information Technology

Digital Logic: Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture: Machine instructions and addressing modes. ALU, data - path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Programming and Data Structures: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms: Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

Theory of Computation: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

Compiler Design: Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

Operating System: Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Computer Networks: Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

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