

कृषि तथा वन विज्ञान विश्वविद्यालय  
सेवा आयोगको कार्यालय

बरिष्ठ इलेक्ट्रिसियन (खुला प्रतियोगिता)

लिखित परीक्षाको पाठ्यक्रम

कुल पूर्णाङ्क: १००

समय: ३ घण्टा

प्रथम पत्र

बस्तुगत प्रश्न

(पूर्णाङ्क: ५० समय: ५० मिनेट)

१. नेपालको संविधान र यसको विकासक्रम
२. जनसंख्या तथा भूगोल- नेपाल तथा दक्षिण एसियाली मुलुकहरूको जनसंख्या तथा क्षेत्रफल
३. इतिहास, संस्कृति र सामाजिक व्यवस्था
  - नेपालको प्राचीनकाल तथा मध्यकालको राजनैतिक आर्थिक सामाजिक सांस्कृतिक र आधुनिक इतिहास
  - नेपालका प्रचलित धर्म, संस्कृति, जनजाति, भाषा साहित्य र कला
  - नेपालको संविधान र यसको विकासक्रम
४. अन्तर्राष्ट्रिय मामिला तथा अन्तर्राष्ट्रिय संघ संस्था
  - दक्षिण एसियाली क्षेत्रिय सहयोग संगठन (SAARC) सदस्य राष्ट्रहरू तथा अन्य मुलुकहरूसँग नेपालको सम्बन्ध
  - संयुक्त राष्ट्र संघ र नेपाल
५. राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरू:
  - राजनैतिक, सामाजिक, सांस्कृतिक, आर्थिक, वैज्ञानिक, खेलकुद, पुस्तक, पुरस्कार, कला
  - साहित्य र संगीत लगायत महत्वपूर्ण व्यक्तित्व तथा विचारकहरू
७. सार्वजनिक प्रशासन
  - सार्वजनिक प्रशासनका विशेषताहरू, सार्वजनिक संगठन र सांगठनिक आधारहरू
  - कर्मचारी प्रशासनका विविध पक्षहरू
  - कार्यालय व्यवस्थापान सम्बन्धी आधारभूत ज्ञान
  - नेपालको शैक्षिक इतिहास
८. संविधान, ऐन, नियम र विश्वविद्यालय संगठन सम्बन्धी

- नेपालको संविधान, प्रमुख विशेषताहरू
- कार्यपालिका, न्यायपालिका र व्यवस्थापिका सम्बन्धी ज्ञान
- नेपालको संविधानमा शिक्षा सम्बन्धी प्रावधान
- संविधान, ऐन, नियम र कार्यव्यवस्थापन प्रणालीको अर्थ र यिनीहरू बीचको अन्तरसम्बन्ध
- शिक्षा प्रणालीको व्यवस्थापन सम्बन्धी विभिन्न ऐन नियमहरू
- विश्वविद्यालय अनुदान आयोग ऐन, २०५०
- चालु र सो भन्दा अघिल्लो पञ्चवर्षीय योजनामा शिक्षा सम्बन्धी व्यवस्था
- शिक्षा मन्त्रालय, अर्थ मन्त्रालय, विश्वविद्यालय अनुदान आयोग र विश्वविद्यालय बीचको सम्बन्धका विविध आयामहरू
- कृ.व.वि.को संगठनात्मक स्वरूप, तिनको अन्तरसम्बन्ध एवम् कार्यक्षेत्र
- कृ.व.वि. ऐन २०६७ (संशोधन सहित), संगठन तथा शैक्षिक प्रशासन सम्बन्धी नियमावली, शिक्षक कर्मचारी सेवा सम्बन्धी नियममवली, आर्थिक व्यवस्थापन सम्बन्धी नियमावली

९. विषयगत सम्बन्धी ज्ञानबाट पनि वस्तुगत प्रश्नहरू सोधिनेछ ।

## द्वितीय पत्र

पूर्णाङ्क : ५०

समय: २ घण्टा १० मिनेट

### विषयगत ज्ञान

#### खण्ड 'क'

प्रशासन, व्यवस्थापन, संविधान, ऐन, नियम र विश्वविद्यालय सम्बन्धी ज्ञान

१. कर्मचारी प्रशासन र सार्वजनिक प्रशासनको अन्तरसम्बन्ध र यसका सिद्धान्तहरू
२. कर्मचारी प्रशासनको विविध पक्षहरू
३. सार्वजनिक प्रशासनको परिभाषा, उद्देश्य र कार्यक्षेत्र
४. नेपालको संविधान र सम्बैधानिक विकासक्रम
५. नेपालको संविधानका प्रमुख विशेषताहरू, कार्यपालिका, न्यायपालिका र व्यवस्थापिकाको गठन प्रकृया, एक अर्काबीच अन्तरसम्बन्ध
६. नेपालको संविधानले व्यवस्था गरेका मौलिक हक र नागरिक अधिकार, नागरिकहरूको मौलिक हक कार्यान्वयन सम्बन्धी व्यवस्था र नागरिकको कर्तव्य

७. शिक्षा र उच्च शिक्षाको सम्बैधानिक व्यवस्था  
द.नेपालमा विश्वविद्यालयको स्थापना र विकासक्रम
९. कृषि तथा वन विज्ञान विश्वविद्यालय ऐन २०६७
१०. कृषि तथा वन विज्ञान विश्वविद्यालय संगठन र शैक्षिक प्रशासन नियमावली २०६९
११. कृषि तथा वन विज्ञान विश्वविद्यालय शिक्षक कर्मचारी सेवा नियमावली २०६९
१२. कृषि तथा वन विज्ञान विश्वविद्यालय आर्थिक प्रशासन नियमावली २०६९

## खण्ड 'ख'

### समूह पदसँग सम्बन्धित ज्ञान

#### 1. D.C. CIRCUIT ANALYSIS

Electric current, EMF and Voltage, Resistance and Ohm's law, Basic circuit elements – Resistors, Capacitors, Inductors, Delta/Star and Star Delta transformations, Kirchhoff's law, Electrical Circuit and Network theorems, Series and parallel circuits, Thevenin's equivalent circuit, Norton's equivalent circuit, Reciprocity theorem, Superposition theorem, Maximum Power transfer, Nodal and mesh method of network analysis,

#### 2. A.C. CIRCUIT ANALYSIS

Generation of alternating voltage, average values, RMS values, RMS or effective values of any types of alternating voltage and current wave form, Phasor algebra, steady state response of circuits, Concept of admittance, reactance, active power, reactive power and apparent power, resonance in series and parallel RLC circuit, bandwidth, effect of Q-factors in resonance.

#### 3. ELECTRICAL MACHINES

- Transformer : Constructional detail, Operating principle, Equivalent Circuit, Losses and efficiency, Voltage regulation, Auto transformer, transformer connections, Parallel operation, overloading capacity; temperature rise
- DC Machines: Working principles; types; operating characteristics; armature reaction; losses and efficiency; applications, starting and speed control of DC motors.
- Synchronous machines: Working principles; operating characteristics; losses and efficiency; steady state and transient equivalent circuits; excitation system and requirement, governor principle; parallel operation; hunting.
- Induction Machines: Working principles; operating characteristics of motoring and generating mode; losses and efficiency; equivalent circuits; starters; speed control and motor selection.

#### 4. INSTRUMENTATION & MEASUREMENT

Principles of moving coil instrument, Measurement of voltage and current, various electrical measuring instruments: galvanometer, voltmeter, sensitivity of voltmeter, ammeter, ohmmeter, Megger, Earth resistance meter, multi-meter, and oscilloscope, Wheatstone bridge, inductance and capacitance bridges, probability of error and calibration.

## **5. GENERATION, TRANSMISSION AND DISTRIBUTION**

- Hydroelectric Power Plants: Merits and demerits; site selection; classification; elements of hydroelectric power plant and schematic layouts; different types of water turbines; efficiency curves; selection of water turbines; essential features of hydroelectric alternators; choice of size and number of generating units; auxiliaries in hydroelectric plant; Nepalese power plants, their types, salient features and locations.
- Diesel Power Plants: Elements of a diesel power plant, schematic arrangement; working principle, efficiency, cooling, governing, speed control, application, performance and thermal efficiency, alternators used for diesel units, advantages and disadvantages of diesel plants.
- Non-Conventional method of power generation: Concept of solar photovoltaic, wind and geothermal method of power generation and their importance
- Power transmission system: Overhead and underground transmissions, advantages and limitations of high voltage transmission; choice of working voltage, conductor size and configuration, supports and cross arms, insulators used in overhead lines, vibration dampers sag tension calculation.
- Power Distribution System: Voltage levels, primary and secondary distribution, radial and ring mains distribution, single phase and three phase ac distribution, pole/tower types, conductors and insulators used in distribution lines, distribution transformer and its accessories, protection coordination in distribution system.

## **6. POWER SYSTEM ANALYSIS**

- Load flow: Y-bus of a power system network, Gauss-Seidal and Newton-Raphson methods
- Over voltages in transmission lines: Power frequency, switching and lightning over voltages, surge arrestors
- Voltage control: Necessity of voltage control; methods of voltage control.
- Fault calculations: Symmetrical components, grounded & ungrounded systems, L-G, L-L, L-L-G and 3-phase faults.
- Stability studies: Steady state & transient stability limits, swing equations, equal area criterion, stability enhancement techniques.
- Corona: corona inception voltage, power loss, waveform deformation, RI and AN due to corona

## **7. SAFETY ENGINEERING**

Electric Shock Hazards, Earthing and Shielding Techniques for electrical equipment, Electrical induction into communications lines, surge protection, Industrial radiation hazards, Lightning Protection, safe value of current and voltages, Fuse, Circuit Breaker, Isolators, Fire hazards; fire-fighting techniques and equipment;

## **8. INDUSTRIAL ELECTRIFICATION**

Illumination, Design of Electrical Heating System, Electrical Installation Systems, Emergency and backup electrical supplies, Battery: Lead acid, Charging / Discharging characteristics, Voltage regulator, Materials Used in the Electrical Equipment, Power Cables, Electrical drawing

## **9 D.C. CIRCUIT ANALYSIS**

Electric current, EMF and Voltage, Resistance and Ohm's law, Basic circuit elements—Resistors, Capacitors, Inductors, Delta/Star and Star Delta transformations, Kirchhoff's

law, Electrical Circuit and Network theorems, Series and parallel circuits, Thevenin's equivalent circuit, Norton's equivalent circuit, Reciprocity theorem, Superposition theorem, Maximum Power transfer, Nodal and mesh method of network analysis,

#### **10 A.C. CIRCUIT ANALYSIS**

Generation of alternating voltage, average values, RMS values, RMS or effective values of any types of alternating voltage and current wave form, Phasor algebra, steady state response of circuits, Concept of admittance, reactance, active power, reactive power and apparent power, resonance in series and parallel RLC circuit, bandwidth, effect of Q-factors in resonance.

#### **11 ELECTRICAL MACHINES**

- Transformer : Constructional detail, Operating principle, Equivalent Circuit, Losses and efficiency, Voltage regulation, Auto transformer, transformer connections, Parallel operation, overloading capacity; temperature rise
- DC Machines: Working principles; types; operating characteristics; armature reaction; losses and efficiency; applications, starting and speed control of DC motors.
- Synchronous machines: Working principles; operating characteristics; losses and efficiency; steady state and transient equivalent circuits; excitation system and requirement, governor principle; parallel operation; hunting.
- Induction Machines: Working principles; operating characteristics of motoring and generating mode; losses and efficiency; equivalent circuits; starters; speed control and motor selection.

#### **12 GENERATION, TRANSMISSION AND DISTRIBUTION**

- Hydroelectric Power Plants: Merits and demerits; site selection; classification; elements of hydroelectric power plant and schematic layouts; different types of water turbines; efficiency curves; selection of water turbines; essential features of hydroelectric alternators; choice of size and number of generating units; auxiliaries in hydroelectric plant; Nepalese power plants, their types, salient features and locations.
- Diesel Power Plants: Elements of a diesel power plant, schematic arrangement; working principle, efficiency, cooling, governing, speed control, application, performance and thermal efficiency, alternators used for diesel units, advantages and disadvantages of diesel plants.
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- Power transmission system: Overhead and underground transmissions, advantages and limitations of high voltage transmission; choice of working voltage, conductor size and configuration, supports and cross arms, insulators used in overhead lines, vibration dampers sag tension calculation.
- Power Distribution System: Voltage levels, primary and secondary distribution, radial and ring mains distribution, single phase and three phase ac distribution, pole/tower types, conductors and insulators used in distribution lines, distribution transformer and its accessories, protection coordination in distribution system.

#### **13 INDUSTRIAL ELECTRIFICATION**

Illumination, Design of Electrical Heating System, Electrical Installation Systems, Emergency and backup electrical supplies, Battery: Lead acid, Charging / Discharging characteristics, UPS, Inverter, Thyristor controlled rectifier, Three phase Rectifier, DC/DC converter, Voltage regulator, Materials Used in the Electrical Equipment, Power

Cables, Electrical drawing

#### 14. SWITCHGEAR AND PROTECTION

- Types of protective relays; working principle and application, electromagnetic, static and digital relays
- Protection of generators, transformers and transmission and distribution lines
- Characteristics of ACB, OCB, VCB, ABCB and gas circuit breakers and their applications;
- Over voltage computations, Protection against over voltage and lightning , surge arrestors
- Substations; classification; indoor and outdoor substations; selection and location of site; bus bar arrangements; substation switchgear; substation earthing.

#### 15. POWER SYSTEM ANALYSIS

- Load flow: Y-bus of a power system network, Gauss-Seidal and Newton-Rapshon methods
- Over voltages in transmission lines: Power frequency, switching and lightning over voltages, surge arrestors
- Voltage control: Necessity of voltage control; methods of voltage control.
- Fault calculations: Symmetrical components, grounded & ungrounded systems, L-G, L-L, L-L-G and 3-phase faults.
- Stability studies: Steady state & transient stability limits, swing equations, equal area criterion, stability enhancement techniques.
- Corona: corona inception voltage, power loss, waveform deformation, RI and AN due to corona

THE END

#### कम्प्युटर प्रयोग सम्बन्धी ज्ञानको प्रयोगात्मक परीक्षाको पाठ्यक्रम

1. Knowledge of operating systems: Microsoft Windows & their version
2. Knowledge to backup data and store them for further use.
3. Knowledge of essential application programs: a) Microsoft office package (MS word, MS excel, MS power point & MS Access) b) Data base Programs (Dbase & Fax Pro.) c) Photo editing programs (Paintbrush, Adobe Photoshop, Macromedia, freehand package etc.) programs
4. Printing & Scanning knowledge
5. Internet & E-mail uses for official purposes.

#### Evaluation Method

- Typing letters using MS word in Nepali & English scripts
- Design Pvc card using appropriate program
- Maintain the database of AFU staff using MS excel/Access
- PowerPoint Presentation