

प्रा.अम. जेनेरेटर मेकानिक्स (खुला र आन्तरिक) पदको पेशा सम्बन्धी विषयको लिखित परिक्षा योजना र पाठ्यक्रम

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या X अङ्क	समय
पेशा सम्बन्धी	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	४० प्रश्न X १ अङ्क = ४०	२ घण्टा ३० मिनेट
			विषयगत (Subjective)	छोटो उत्तर	१५ प्रश्न X २ अङ्क = ३०	
				लामो उत्तर	६ प्रश्न X ५ अङ्क = ३०	

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1. **Basic Electronics**

1.1 **Passive components**

Resistor and Potentiometers – Types, Color Codes, Series and Parallel combination, Inductive components, Capacitors and its types

1.2 **Semiconductor**

Introduction, Semiconductor Diode – PN Junction, Zener Diode, Breakdown, Applications, Rectifier circuits

1.3 **Transistor**

Bipolar Junction Transistor – Basic Structure of NPN and PNP, Working, Biasing, VI Characteristics, Testing, Applications

1.4 **Transistor Amplifier Circuits**

CE, CB, CC Configurations, Special Semiconductors – SCR, JFET, MOSFET, Photo Diode, Triac

1.5 **Power Electronics**

Power diode, power transistor, Thyristor, Power rectifier, DC Choppers, Inverters, AC Voltage Controller

1.6 **Logic gates**

Binary number system, logic gates, truth table, function and applications, ADC and DAC

2. **Basic Electrical Engineering**

2.1 **General Electrical**

Fundamental of Electricity, Electrical conductor and insulator, Electric cable and High voltage power cable, its type, Current carrying capacity and color coding, Insulation, Material used for insulation and their use, Constituent part of electrical system- Source and load, Current flow in circuits, EMF and potential difference, Electrical units, Ohms law, Resistor and resistivity. Voltage and Current Source, Kirchhoff's law, Series and parallel circuit, Power and energy, Nodal Analysis, Mesh Analysis, Star-Delta & Delta-Star transformation, Faraday's law of Electromagnetic Induction

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- 2.2 **Inductance and Capacitance**  
General Concept of Capacitance and Inductance, Inductor, resistor, capacitor in series and parallel connection
  - 2.3 **Alternating Current**  
AC System, Waveform, Average and RMS Value of Voltage and Current, Form factor, peak factor, Power Factor, Phase voltage, Line Voltage, Phase Current, Line Current
  - 2.4 **Safety Rules and Regulations**  
Static Charge, Insulation techniques, Safety tools, Electrical shocks, resistance of human body and withstanding voltage in dry and wet conditions, safety rules and regulations, Earthing system, Earthing equipment, Earthing and lighting arrestors, Fire Hazards
  - 2.5 **Electrical Measuring Instrument**  
Ammeter, Voltmeter, Measuring resistance, inductance and capacitance with different methods, Measuring power, energy and frequency, Thermocouple, Lux meter, Piezometer Transducer, Digital Measurement
  - 2.6 **Switch Gear and Protection**  
Open and Short Circuits, Fuse, High Rupturing Capacity Fuse (HRCF), Miniature Circuit Breaker, (MCB), Contractors, Moulded Case circuit Breaker (MCCB), Isolators, Relays, CT and PT, Earthing, Protection schemes, ACB (Air Circuit Breaker), Earth Leakage Circuit Breaker, (ELCB), Distribution Board, Pannel Board
  - 2.7 **Auto Electrical and Electronics System**  
Introduce the battery, Cell and plates, Electrolyte, Construction of battery, General maintenance of battery, Methods of battery charging, Testing methods of charged battery
3. **Electrical Machines**
- 3.1 **Magnetic Circuits and Induction**  
Electrostatic Fields in Free Space, Gauss's law in Integral Form and Applications, Magnetic Forces and Torque, Magnetic Circuit Concepts, Principles of Electromechanical Energy Conversion
  - 3.2 **Transformer**  
Construction, Working principle, Operation, Voltage regulation, Losses, Efficiency, single phase and 3 phase transformer, Auto transformer, Star delta connection, Rewinding process
  - 3.3 **Diesel and Petrol Generator**  
Single phase petrol generator, its working principle, Single phase and three phase Diesel Generator, its working principle and use
  - 3.4 **DC Generator**  
Construction, Working principle, Types, Losses and efficiency

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- 3.5 **DC Motor**  
Working Principle, Back EMF, Types, Starting, Speed Control, Losses and Efficiency
  - 3.6 **Synchronous and asynchronous motors**  
Single phase, Split phase, synchronous motors, types, Induction motors and types, torque formulae, motor speed, slip calculations
  - 3.7 **Three phase machines**  
Three phase generators, Three phase motors, Three phase transformers, Three phase starters, AVR
4. **IC Engine**
- 4.1 **Internal Combustion Engine**  
Introduction, History and development of automobile engine, Technical terms used in related to the IC engine, Types of internal combustion engine, Spark ignition engine, Compression Ignition engine, Two stroke and four stroke cycle engine, Operation of spark ignition engine and compression ignition engine, Function and types of combustion chamber, Importance, function and types of engine components, Turbo charger and supercharger
  - 4.2 **Engine Components**  
Functions of valves, Types of valve operating mechanism, Function of piston, Construction & types of piston, Function of piston rings, Construction and types of piston rings, Connecting rod, piston pin, and crankshaft, Function of connecting rod, Construction of connecting rod, Function of crankshaft, Construction of crankshaft, Flywheel, Function and construction of flywheel, Camshaft Function of camshaft, Construction of camshaft
  - 4.3 **Cooling system**  
Operation of the cooling system, types of cooling system, Direct air cooling system, Indirect or liquid cooling system, components of water cooling system
  - 4.4 **Lubricating system**  
Working principle of lubrication system, Function of engine oil, Properties of engine oil, Reasons for using engine oil additives, Types of lubrication system, Oil mixed with petrol or mist Lubrication system, Splash lubrication system, Pressure lubrication system, Main parts of lubrication system, Types of filtration system
  - 4.5 **Air cleaner and exhaust muffler**  
Introduction, Function of air cleaner, Types of air cleaner
  - 4.6 **Petrol fuel system**  
Define the petrol fuel system, main parts of the petrol fuel system, Introduction to carburetor, Function of carburetor
  - 4.7 **Diesel fuel system**  
Main parts of the diesel fuel feed system, Function and construction of fuel feed pump, Function and types of injection pump, Function and types of governor of

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injection pumps, Hydraulic advance mechanism of delivery in distributor pump, Function and types of fuel injector

### 4.8 Ignition system

Function of ignition system, Components of ignition system, Operating principle of ignition system

### 4.9 Charging system

Function of charging system, Charging circuits, Basic principle of generator, Main parts of simple generator, Basic principle of alternator, Types of alternator regulator

### 4.10 Starting system

Introduction to starting system, Function of starter motor, Starter motor circuits, Starter motor drives, Construction of the solenoid switch, Function of the solenoid switch

### 4.11 Sensors

General operation and principle of basic sensors, Mass air flow sensors, Manifold absolute pressure sensor, Intake air temperature sensor, Engine coolant temperature sensor, Crankshaft position sensor, Camshaft position sensor, Oxygen sensor, Knock sensor

### 4.12 Panel Board

Introduction of panel board, Types of panel board, Control system

### 4.13 Governor and Alternator

Introduction and types of governor (Mechanical and Electronics) and its class; Introduction of alternator, its type

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

एकाइ नं. (Unit No.)	अङ्कभार (Weightage)	बहुवैकल्पिक प्रश्न (MCQs) को संख्या	छोटो उत्तर प्रश्नको संख्या	लामो उत्तर प्रश्नको संख्या
1.	15	7	१५ प्रश्न X २ अङ्क	६ प्रश्न X ५ अङ्क
2.	15	8		
3.	30	10		
4.	40	15		
<b>जम्मा</b>	<b>100</b>	४० प्रश्न X १ अङ्क = ४० अङ्क	१५ प्रश्न X २ अङ्क = ३० अङ्क	६ प्रश्न X ५ अङ्क = ३० अङ्क

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### प्रा.अम. जेनेरेटर मेकानिक्स (खुला र आन्तरिक) पदको प्रयोगात्मक परीक्षाको पाठ्यक्रम

समय: १ घण्टा

पूर्णाङ्क : ५०  
उतीर्णाङ्क : २५

विषयवस्तु	प्रश्न संख्या	अंकभार	पूर्णाङ्क
1. Fault Finding 2. Adjustment 3. Tools Handling 4. Load Measurement	10	3	30
5. Parts Identification 6. Viva	10	2	20

द्रष्टव्य: प्रयोगात्मक परीक्षाको लागि लिखित परीक्षाको पाठ्यक्रमबाट प्रश्नहरू सोधिनेछन् ।