

नेपाली सेना

प्रा.अम. हेभि मेकानिक्स (खुला तथा 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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Unit 1

1.1 Heavy Equipment

Basic hydraulic circuit and its components, Close and Open Loop Hydraulic Circuit, Accumulator, Axial and Bent Axis Piston pump, Fixed and variable Displacement Rotary Pump, Internal and External Gear Pump, Reservoir and accessories, Single acting and double acting cylinders, Spool valves, Pressure relief valves, Pressure regulating valves, Pilot operated relief valve, Directional control valve, Modulating valves, Governor valves, Shifting valves, Hoses and couplings, Track types, Hydraulic motors, ROPS, FOPS, Servicing of heavy equipment, Types of heavy equipment

1.2 Heavy Equipment Transmission

Powershift transmission, Torque Converter, Lockup clutch, Fluid Coupling, Multiple Planetary gears, Automatic transmission, Simpson Planetary Gear, Ravigneaux Planetary Gear, Friction clutch, Hydraulic control systems, Governors, Pinion type Final Drive, Bull type Final Drive, Planetary Final Drive, Clutch Packs and Belts, Hydrostatic Transmission, Limited Slip Differential, Hydraulic Retarders, Differential Steering, Articulated Steering, Single & Double Reduction Axle, Tandem Drive, Drive Sprockets, Track Rollers and Carrier Rollers, Idlers, Track Guards, Equalizer bars, Split master links, Track shoes, Track pitch, Undercarriage, Analog and Digital Joystick

Unit 2

2.1 Automobile engine

Introduction, history and development of automobile 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 & supercharger

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2.2 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

2.3 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

2.4 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

2.5 Air cleaner and exhaust muffler

Introduction, Function of air cleaner, Types of air cleaner

2.6 Petrol fuel system

Main parts of the gasoline fuel system, Introduction to carburetor, Function of carburetor

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

2.8 Auto Electrical and Electronics System

Battery, Cell and plates, Electrolyte, Construction of battery, General maintenance of battery, Methods of battery charging, Testing methods of charged battery

2.9 Ignition system

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

2.10 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

2.11 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

Unit 3

3.1 Chassis and frame

Definition of chassis and its functions, Types of chassis or frame, Frame construction

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3.2 Axle

Definition of live and dead axle, Purpose and function of axle and hub

3.3 Suspension system

Definition of the suspension system, Types of spring, Hydraulic suspension, Plastic suspension, Definition of the shock absorber, Types of shock absorber, Types of suspension, Front suspension, Beam axle suspension, Independent Suspension, Types of independent suspension system, Types of independent suspension based on construction, McPherson strut system, Types of rear suspension

3.4 Steering system

Principle of ackerman steering, Main components/parts of the steering system, Introduction of steering gear, Types of steering gear, Worm and roller steering gear, Re-circulating ball steering gear, Rack and pinion steering gear, Worm and sector steering gear, Helical grooved cam steering gear, Screw and nut steering gear, Necessity of lubricants in steering gear box

3.5 Wheel Alignment

Introduction of front end geometry, Camber, King pin inclination, Included angle, Caster, Toe-in Toe-out on turns, Wheel alignment, Definition of wheel balancing, Working principle of power steering, Characteristics of hydraulic oil

3.6 Wheels and Tires

Introduction of wheels and tyres, Types of wheel, Types of rims, Tread pattern of tyre, Types of tyre, Inner tube with tyre, Tubeless tyre, Types of tyre according to the ply, Cross ply tyre, Radial ply tyre, Purpose and methods of tyre rotation

3.7 Braking System

Principle of braking, Hand Brake or Parking brake, Foot brake or service brake, Drum brake, Disc brake, Drum in disc, master cylinder, Types of master cylinder, Purpose and function of wheel cylinder, Types of Wheel cylinder, single acting, double acting, Principle of hydraulic brake, Advantages and disadvantages of hydraulic brake, Properties of brake fluid, Purpose and procedure of brake bleeding, Various parts of air brake, Purpose and function of Mechanical brake or Parking brake, Importance and function of brake booster

3.8 Transmission

Need of transmission system in a vehicle, Different layout of the power transmission in a vehicle

3.9 Clutch

Necessity for a clutch in a vehicle, Types of clutch used in vehicle, Function of the clutch, Various types of clutch actuation system, Mechanically operated clutch, Hydraulically operated clutch, Trouble shooting of clutch

3.10 Gearbox

Necessity of a gear box in a vehicle, Different types of gear boxes, Various components and their functions in a sliding mess gearbox, Various components and their functions in a constant mess gearbox, Various components and their function of synchromesh gearbox, Advantages and disadvantages of different types of gear box, Different types of gear, Various types of gear shift mechanism, Working principle of gear shift mechanism

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3.11 Propeller shaft

Function of the propeller shaft, various components used in the power transmission, Need for center bearing

3.12 Universal Joint and Slip Joint

Need for a universal joint, Function of a universal joint, Need for a slip joint

3.13 Rear Axle Assembly

Various types of axle housings, various types of rear axles

3.14 Final drive

Introduction to transaxle, Need for a differential, Function of the differential, Types of differential

3.15 Four wheel drive and Transfer case

Difference between two wheel drive and four wheel drive, Need of transfer case

Unit 4

4.1 Basic Electrical/ Electronics

Current, Voltage, Resistor, Electrical Circuit, Single Phase and Three Phase, Ohm's Law, Resistance and temperature variation of resistance, Series and parallel combining of resistance, Kirchhoff's law, Power and Energy, EMF, Faraday's law of EMF. Construction and working Principle of Transformer, Primary and secondary cell

4.2 Thermodynamics

Introduction of Thermodynamic system and its properties, State of thermodynamic system, Cycle, Thermodynamic Process, Temperature, Heat, Work and Energy, Gas laws of thermodynamics (Boyles law, Charles law), Internal Energy, Thermal Efficiency, 1st law of Thermodynamics, Constant volume process, constant pressure process, constant temperature process, Isothermal and adiabatic process, poly-tropic process & cycles (Otto Cycle, Diesel cycle, Refrigeration cycle), Mode of heat transfer (Convection, Conduction, Radiation)

4.3 Workshop Technology

Introduction and types of safety, Properties of workshop, Arc Welding, Gas Welding, Drilling, Grinding

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ ।

एकाइ नं. (Unit No.)	अङ्कभार (Weightage)	बहुवैकल्पिक प्रश्न (MCQs) को संख्या	छोटो उत्तर प्रश्नको संख्या	लामो उत्तर प्रश्नको संख्या
1.	30	12	१५ प्रश्न X २ अङ्क	६ प्रश्न X ५ अङ्क
2.	30	12		
3.	30	12		
4.	10	4		
जम्मा	100	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. हेभि मेकानिक्स (खुला तथा 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	10	3	30
4. Parts Identification 5. Viva	10	2	20

द्रष्टव्य: प्रयोगात्मक परीक्षाको लागि लिखित परीक्षाको पाठ्यक्रमबाट प्रश्नहरू सोधिनेछन् ।