

नेपाल सरकार  
गृह मन्त्रालय  
प्रहरी प्रधान कार्यालय  
(मानवश्रोत एवं प्रशासन विभाग, भर्ना तथा छनौट महाशाखा)  
नक्साल, काठमाण्डौ ।

प्राविधिक प्रहरी नायव निरीक्षक (अटोमोवाइल ओभरसियर) समूहको खुला प्रतियोगितात्मक लिखित तथा प्रयोगात्मक परीक्षाको पाठ्यक्रम ।

पाठ्यक्रमको रूपरेखा:- यस पाठ्यक्रमको आधारमा निम्नानुसार तिन चरणमा परीक्षा लिईने छ :-

प्रथम चरण:- लिखित परीक्षा (Written Examination)	पूर्णाङ्क :- १५०
द्वितीय चरण:- प्रयोगात्मक (Practical)	पूर्णाङ्क :- ५०
तृतीय चरण:- अन्तरवार्ता (Interview)	पूर्णाङ्क :- ३०

प्रथम चरण:- लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या x अङ्कभार	समय
प्रथम	अटोमोवाइल ईन्जिनियरिङ्ग	१००	४०	बस्तुगत बहुउत्तर (Multiple Choice)	५० x २ = १००	४५ मिनेट
द्वितीय	नेपाल प्रहरी सेवा सम्बन्धी	५०	२०	बस्तुगत बहुउत्तर	१० x १ = १०	१ घण्टा १० मिनेट
				विषयगत	लामो उत्तर १ x १० = १० छोटो उत्तर ६ x ५ = ३०	

द्वितीय चरण - प्रयोगात्मक परीक्षा योजना (Practical Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
अटोमोवाइल ईन्जिनियरिङ्ग	५०	२०	प्रयोगात्मक	१ घण्टा

तृतीय चरण

परीक्षाको किसिम	पूर्णाङ्क	परीक्षा प्रणाली
ब्यक्तिगत अन्तवार्ता	३०	मौखिक

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- पाठ्यक्रममा भएका यथासम्भव सबै पाठ्याँशबाट प्रश्न सोधिने छन् ।
- पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ ।

पाठ्यक्रमका एकाई	१	२	३	४
प्रश्न संख्या	१२	१८	१०	१०

४. यस पाठ्यक्रममा जे सुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन निययमहरु तथा नीतिहरु परिक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई ) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्छ ।
५. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत २ (दुई) अंक दिईने छ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २०% अर्थात ०.४ अंक कट्टा गरिने छ । तर उत्तर नदिएमा त्यस बापत अंक दिईने छैन र अंक कट्टा पनि गरिने छैन ।
६. प्रथम चरणको लिखित परिक्षावाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको प्रयोगात्मक परीक्षामा सम्मिलित गराईने छ ।
७. अन्तर्वार्ताको अंकभार सम्बन्धमा प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-१९ मा व्यवस्था भए बमोजिम हुनेछ ।
८. पाठ्यक्रम लागू मिति :- २०७०/०७/१५ गते ।

# 1. AUTOMOBILE TECHNOLOGY -I

## 1.1. Introduction

### 1.2. Short History of Automobile:

- a. Development of engines
- b. Nomenclature of different automobile aggregates
- c. Introduction of automobile aggregates and their process
- d. Introduction to types of vehicles: car, truck and SP. vehicle

### 1.3. Transmission and Mechanism :

- a. Clutch :
  - I. Types of Clutch
  - II. Construction of clutch actuating mechanism
  - III. Uses of fluid or hydraulic coupling
- b. Gear Box :
  - I. Different types of gear box
  - II. Use and importance of gear shifting mechanism
  - III. Operation of epicyclic gear train in forward and reverse motion
  - IV. Operation of torque convertor
  - V. Operation of overdrive
- c. Propeller Shaft and Universal Joint:
  - I. Drive Mechanism from gearbox to final drive in conventional cars and trucks
  - II. Construction of propeller shaft like :
  - III. Torque tube drive arrangement
  - IV. Hutch kiss drive arrangement
- d. Rear axle assembly :
  - I. Use of different types of final drive
  - II. Use of different in the rear axle
  - III. Types of axle housing :
    - Banjo Type
    - Split bell type
  - IV. Function of axle and housing if different types of mounting axle
- e. Front axle and steering :
  - I. Front axle with different types of steering heads
  - II. Different types of steering linkages
  - III. Need for Wheel alignment
  - IV. Use of Different types of steering gear boxes
  - V. Operation of power steering
  - VI. Steering lock and turning radius
- f. Brakes :
  - I. Purpose of brake in a motor vehicle
  - II. Function of brake mechanisms in a motor vehicle
  - III. Setting of brakes
  - IV. Function of pneumatic brake or power brake
  - V. Disk brake
- g. Suspension System :
  - I. Use of suspension arrangement in vehicle

- II. Types of suspension system
- III. Types of shock absorber
- h. Wheel and tires :
  - I. Feature of wheels
  - II. Feature of disc type wheel rim assembly
  - III. Merits of different types of rims
  - IV. Arrangement of dual disc
  - V. Structure of tire section
  - VI. Cross ply and radial ply tires
  - VII. Factor effecting tire life
  - VIII. Tire pressure and its effects
  - IX. Changing of tire and its effects
  - X. Belted tires
- i. Chassis and frames :
  - I. Different layouts of chassis
  - II. Different types of frames

## **2. AUTOMOBILE TECHNOLOGY -II**

### **2.1. Introduction**

### **2.2. Fuel :**

- a. Types of fuel :
- b. Fuel Structure
- c. Properties of liquid fuel :
  - I. Volatility of fuel
  - II. Flash point
  - III. Ignition temperature
  - IV. Calorific value
  - V. Octane number
  - VI. Cetane number
  - VII. Antilock value and ignitability of fuel
  - VIII. Tetra ethyl-lead content

### **2.3. Combustion Chambers of Diesel Engine :**

- a. Types of Combustion chambers
- b. Direct Injection combustion chamber
- c. Indirect Injection combustion chamber
- d. Advantages of DI combustion chamber
- e. Disadvantages of combustion chamber
- f. IDI swirl type chamber
- g. IDI pre chamber system chamber type
- h. Advantages of IDI combustion chamber
- i. Disadvantages of IDI combustion chamber

## **2.4. Super Charging :**

- a. Introduction
- b. Theoretical cycle of supercharged engines
- c. Supercharging systems :
  - I. Principle
  - II. Components
  - III. Applications
- d. Turbocharging systems :
  - I. Principle
  - II. Components
  - III. Application
- e. Inertia Supercharging Systems:
  - I. Principle
  - II. Components
  - III. Applications

## **2.5. Electricity, Magnetism and Automobile Wiring Circuit :**

- a. Conductors, insulators, semi-conductors and their materials
- b. Ohm's law, electromotive force, potential difference and voltage drop
- c. Series and parallel circuit
- d. Effects of electric current
- e. Magnetism, first law of magnetism
- f. Symbol used in car wiring
- g. Types of wiring system
- h. Harness and color coding in automobile wiring
- i. Electric circuit of an automobile
- j. Starting circuit of an automobile
- k. Battery coil, Ignition circuit
- l. Magneto ignition circuit
- m. Charging circuit
- n. Lighting circuit
- o. Accessory circuit
- p. Types of bulbs of an automobile
- q. Headlights of car automobile
- r. Side lights, taillight, fog light and search light

## **2.6. Automobile Battery :**

- a. Construction of battery
- b. Function of lead acid battery
- c. Charging of lead acid battery
- d. Maintenance of lead acid battery
- e. Procedure of commissioning new battery

## **2.7. Ignition System :**

- a. Layout of coil and magneto ignition system
- b. Parts of coil ignition system
- c. Ignition coil
- d. Distributor
- e. Condenser
- f. Spark Plug
- g. Function of coil Ignition system
- h. Ignition timing
- i. Automatic advancing and retarding of ignition timing
- j. Part of magnetic ignition system
- k. Type of magneto
- l. Working principle of flywheel magneto
- m. Merits and demerits of coil-ignition and magneto-ignition system
- n. Transistorized ignition system using a magnetic pickups unit equipped with two wheeler engine and understand its circuit

## **2.8. Automobile Starter :**

- a. Function of starter motor
- b. Starting situation under which IC engine is to be cracked by the starter motor and its torque requirements
- c. Starter switches
- d. Working of different starting mechanism

## **2.9. Automobile Generator :**

- a. Function of generators with their merits
- b. Function of different parts of D.C. Generator
- c. Function of different parts of AC Generator or Alternator
- d. Drives bearing and fan for generator
- e. Working of charging system

## **2.10. Automobile Cutout and Regulator :**

- a. Function of cutout in charging circuit
- b. Necessity for the control of generator outputs
- c. Function of automatic current and voltage regulator
- d. Fields excitation and voltage regulation of alternator
- e. Function of transistorized voltage regulator, incorporated with a field rely, equipped with alternator charging system and its circuit
- f. Function of automatic current and voltage regulator
- g. Field excitation and voltage regulation of alternator

## **2.11. Accessories in Automobile :**

- a. Electricity operated horn
- b. Cutout of relay in horn circuit
- c. Electricity operated fuel pump
- d. Purpose and types of traffic indicator
- e. Flash light types indicator
- f. Transistorized flasher unit and its circuit
- g. Understand petrol gauge and its circuit
- h. Temperature gauge
- i. Speedometer

**2.12. Control Devices :**

**2.13. Other Electrical Operated Devices :**

**2.14. Electronics Devices :**

**2.15. Lubricating system**

**2.16. Lubricants as SAE, Castrol, ESSO, etc.**

**2.17. Cooling system**

- a. Types of cooling system and its operating
- b. Air cooling system
- c. Water cooling system

**3. AUTOMOBILE TECHNOLOGY –III**

**3.1. Small Engines and Appliances:**

- a. Land mover
- b. Generator
- c. Compressor

**3.2. Farm Equipment:**

- a. Tractor

**3.3. Construction and mining equipment:**

- a. Dozer
- b. Road building equipment

**3.4. Non-Conventional Energy Vehicles :**

- a. Battery operated or Electrical Vehicle (EV): Trolley Bus, SAFA Tempo, Train etc
- b. Alcohol operated
- c. Solar operated
- d. LPG Plug and CNG operated
- e. Hybrid vehicle-Hydrogen fuel cells

### **3.5. Air Pollution from Vehicles and Its Controls :**

- a. CO-Pollution and its measurement
- b. HSU and measurement
- c. NOX,SOX,HC,PHS pollutants from automotive vehicles
- d. Control devices , VRS, CC, Canister etc.

### **3.6. Driving :**

- a. Traffic rules and regulation

### **3.7. Motor vehicles Acts and rules**

- a. Nepalese motor vehicle Acts

## **4. AUTOMOBILE TECHNOLOGY –IV**

### **4.1. Concept of maintenance, Repairs and Wear in vehicles**

- a. Types of Maintenance
- b. Repair and its purpose
- c. Overhaul and running repair
- d. Types of wear: natural and accidental wear :
  - I. Adhesives wear
  - II. Oxidative wear
  - III. Thermals wear
  - IV. Abrasives wear
  - V. Pitting wear

### **4.2. Concept of motor vehicle**

- a. Forces acting on a motor vehicle
  - I. Tractive force
  - II. Resistance force
- b. Transmission efficiency
- c. Traction characteristics of motor vehicle
- d. Road Resistance
- e. Rolling resistance
- f. Air resistance
- g. Fuel economy of a motor vehicle
- h. Fuel economy characteristics
- i. Fuel consumption equation

बस्तुगत बहुउत्तर नमूना प्रश्नहरु :-

- 1. Continuity in the field coil windings can be tested with**
  - a) Multi meter
  - b) Glower
  - c) Voltmeter
  - d) None of the above
- 2. The 'Dweel' is**
  - a) The time for which the points remain closed
  - b) The distance between the com lobes
  - c) The angle at witch the heal contacts the cam
  - d) None of the above
- 3. Secondary filter in a diesel engine is**
  - a) Must
  - b) Installed between the fuel tank and feed pump.
  - c) Optional
  - d) Not capable of removing water from the fuel.
- 4. When the engine is not and running at 600rpm, the gasoline is supplied by the**
  - a) Idle system
  - b) Low- speed system
  - c) Choke system.
  - d) Main metering system
- 5. Synchronizing devices are normally used when shitting in to**
  - a) First
  - b) Second
  - c) Third
  - d) All of the above

**भाग १**  
**प्रयोगात्मक परीक्षा**

१. समय :- १ घण्टा
२. पूर्णाङ्क :- ५०
३. उत्तिर्णाङ्क :- २०
४. प्रश्न संख्या :- ३ वटा (सबै अनिवार्य)
५. प्रश्नको निर्माण, प्रश्नभार (Weightage) र समयको विवरण

S.N.	Topics	Marks	Time	Remarks
1.	Engine transmission, Suspension, Lubricating, Cooling, Steering, chassis and body	20	30 Min.	
2.	Electrical and Electronics equipment System	15	15 Min.	
3.	Tools measurement equips and machine	15	15 Min.	
<b>Total</b>		<b>50</b>	<b>1 hour</b>	

६. क) Engine, Transmission, Suspension, Cooling Steering, Chassis and Body मध्ये एउटा Practical जाँच लिईने छ ।
- यदि राम्रोसँग Solve गर्न सकेको खण्डमा २० अंक प्रदान गरिनेछ ।
  - यदि आंशिक रूपमा Practical Solve गर्न सकेको खण्डमा १० अंक प्रदान गरिने छ ।
  - यदि पूर्ण रूपमा Solve गर्न नसकेको खण्डमा ० अंक प्रदान गरिने छ ।
- ख) Electrical System अर्न्तगत Self Starter, Alternator , Battery, Charging Circuit, Lighting Circuit, Heating circuit, Ignition Circuit को बारेमा Practical Solve गर्न दिइने छ ।
- यदि राम्रोसँग Solve गर्न सकेको खण्डमा १५ अंक प्रदान गरिनेछ ।
  - यदि आंशिक रूपमा Practical Solve गर्न सकेको खण्डमा ७.५ अंक प्रदान गरिने छ ।
  - यदि पूर्ण रूपमा Solve गर्न नसकेको खण्डमा ० अंक प्रदान गरिने छ ।
- ग) Tools, Equipment, Measurement and machine operating भन्नाले Automobile सँग सम्बन्धित विभिन्न प्रकारका Machine प्रयोग विधि वा प्रयोग गरेर देखाउनु पर्ने छ ।
- यदि राम्रोसँग Solve गर्न सकेको खण्डमा १५ अंक प्रदान गरिनेछ ।
  - यदि आंशिक रूपमा Practical Solve गर्न सकेको खण्डमा ७.५ अंक प्रदान गरिने छ ।
  - यदि पूर्ण रूपमा Solve गर्न नसकेको खण्डमा ० अंक प्रदान गरिने छ ।

-समाप्त-