Nepal Airlines Corporation
Syllabus for Technical Officer Grade- VI
General Technical Services
(Internal Competition)

Subject: Service Related **Full Marks: 100**
Time: 1 Hour 40 Minutes **Pass Marks: 40**
No. of Questions – 100 Objectives questions x 1 Marks Each
All answers must be written in Black letters

COURSE CONTENT

1. **Workshop and Maintenance Practices**: **20 Marks**

1.1 Fabrication Practices (General Concept)

1.1.1 Arc Welding: Introduction, Advantages and Applications, Arc Welding Equipment and Accessories. Arc Welding Methods and Procedures, Welding Electrodes, Job Preparation in Arc Welding (Surface Preparation, fixing and tag welding, slag removing and re-striking), Welding Defects (Causes and Remedies), Safety in Arc Welding.

1.1.2 Oxyacetylene Welding (Gas Welding): Introduction, Advantages and Applications. Equipment Tools and Accessories (Uses and Care). Flame types (oxidizing, reducing and neutral) and their uses, Welding techniques, Welding Defects (Causes and remedies). Flame Cutting Principle and Techniques, Special Tools Used in Flame Cutting, Special Safety Precautions in Gas Welding and Flame Cutting.

1.1.3 Resistance Welding: Introduction, Applications, types and uses in aircraft maintenance Shop

1.1.4 Heat Treatment: Concept, Uses, Advantages, Types (Annealing, Hardening, Tempering, Surface Hardening, etc.).

1.1.5 Welding Jigs and Fixtures

1.2 Machine Shop Practice:

1.2.1 Accident Prevention and Safety Precautions in Machine Shop.

1.2.2 Limits, Fits and Tolerances: (Definitions, System and Uses), Representation in engineering drawing.

1.3 Tools and Technique:

1.3.1 Basic tools: hand tools, power tools, use of precision measuring tools, (lubrication, Draying), Cutting and Shaping tools, spanners, wrenches, torque wrenchs, grinding, broaching. Operation, function & use of electrical general test equipment.

1.3.2 Engineering drawings, diagram & standards: orthographic projection. First Angle & third angle , isometric and oblique projection. Wiring diagrams & schematic diagrams Standard conventions, symbols and legends, scale and dimensioning. Specific Symbolic representation, limit/fits/tolerances.

2. Automobile Technology (Basic Concepts): 10 Marks

2.1 Introduction/ History and principle s: Thermodynamics , heat and mass transfer, evolution of heat engines ,types of heat engines and heat engine cycles: laws of thermodynamics , efficiency and Carnot engine cycle : COP and heat pump cycle.

2.2 Transmission and Mechanism:

2.2.1 Clutches: types/ working principles: Maintenance.

2.2.2 Gear Boxes: Concept of gear ratio: construction: Maintenance.
2.2.3 Propeller Shaft and Universal Joint: Construction & Maintenance.
2.2.4 Rear Axle Assembly: Construction and Maintenance
2.2.5 Front axle and Steering: Construction and Maintenance
2.2.6 Brakes: Types, Construction and Maintenance
2.2.7 Suspension System: Types, Construction and Maintenance
2.2.8 Wheels and Tires: Types and Maintenance
2.2.9 Chassis and Frames: Construction and Maintenance.

2.3 Fuel System and fuel properties: Types of ignition systems, working principles and fuel properties Specifications

2.4 Air Pollution and Its Controls: Pollutants from Automobiles and control measures.

2.5 Concept of Maintenance, Repairs and Wear in Vehicles:

2.5.1 Types of maintenance repair and its purpose, Overhaul and running repair/ Schedule and non schedule maintenance

2.5.2 Types of Wear: Adhesives wear, Oxidative wear, Thermal Wear, Abrasive Wear, etc.

2.6 Automobile refrigeration and air-conditioning system: Concept, Types, Components and Working Principles, General Maintenance and Troubleshooting, Psychrometric chart and its application.

3. Hydraulics and Pneumatics: (Basic Concept) 10 Marks

3.1 Hydraulic systems: General principles
3.2 Hydraulic fluids: introduction and types
3.3 Pumps: Gear/Piston Pumps and their introduction.
3.4 Hydraulics Motors : Introduction and Basic vConcepts.
3.5 Hydraulic Cylinders: (Single/Double acting, Vane and miscellaneous type Cylinders).
3.6 Accumulators: Purpose and Function
3.7 Components of Pneumatic Systems.
3.8 Compressors: basic introduction.
3.9 Air Cylinders/Air Motors: Concept and introduction.
3.10 Valves: (Pressure/Flow/Direction Control Valves): Identification and uses
3.11 Receiver and Filters: necessity and importance

4. Technological Management: 10 Marks

4.1 Production process and Productivity, Concept of Time and motion study .
4.2 Materials Handling.(Safe and Efficient handling Procedures)
4.3 Quality Control: Objective and Importance, TQM Concept and application.
4.4 Inventory Management: Meaning and Necessity: EOQ Models
4.5 Estimating and Costing: Estimating and Costing of Jobs and Services/ Calculations
4.6 SOP of jobs/services (Concept and benefits): Requirement of SOP
4.7 Rules and Regulations of General Technical Activities

5. Industrial Hygiene and safety: **10 Marks**

5.1 Industrial Environment: Health Hazards and Their Prevention.
5.2 Pollution in Industrial Environment (Air Pollution, Industrial Vibration, Noise Pollution, Radiations).
5.3 Electrical Accident Prevention (Electrocution/Electrical fires /Short Circuits)
5.4 Industrial Lighting and Ventilation. (Concept)
5.5 Fire Protection.
5.5.1 Fire Hazards and principles of prevention.

5.5.2 Storage of Explosives and flammable inventories.

5.5.3 Fire Alarm System (Basic Concept and Operating Techniques)

5.5.4 Suppression of fire and fire fighting equipments.

5.6 Chemical handling: Effects of Toxic Materials. Store of Toxic Materials.

5.7 Safety Requirements of industrial Equipment and Processes: Machine Guarding, Operating Controls, Safeguards, Interlocks, signals and Colors, Hoisting, Loading and Handling Mechanisms/ Procedures.

5.8 Three types Safety (Personal/Equipment/Job)

6. Metrology(Measurement Techniques) 10 Marks

6.1 Standard, Units of Measurement used in Engineering Practices.

6.2 Measuring Instruments (Construction, Types, Applications and Care).

6.2.1 Measurements: Precision and Non-precision.

6.2.2 For Surface Level, Surface Straightness Measurements: Spirit Level, Straight Edge, etc.

6.2.3 Graduation. (Calibration) and Reading of Measuring Instruments.

6.2.4 Error, its Types and Measurement - of Errors

7. Materials and Hardware 30 Marks

7.1 Metals & Alloys (Ferrous & Non ferrous)

7.2 Mechanical properties of metals, elasticity, hardness, ductility, tensile strength, fatigue strength and impact resistance.

7.3 Corrosion protection, , causes & types of corrosion, protection of metals by anodizing, plating, coating, and painting.

7.4 Non-metallic materials: properties & utilization of wood, glue, fabric, paint, rubber, plastics, glass, fiberglass & textiles on aircraft. Structural composite materials, Sealant & bonding agents.

7.5 Fasteners, screw threads, screw nomenclature, Thread forms, dimension and tolerance for standard threads .

7.6 Bolt types, specifications, identification and marking bolts, international standards. Nuts:
self locking, anchor, standard types.

7.7 Locking devices: Tab & spring washers, locking plates, split pins, wire locking, quick release fasteners, keys, circlips, cotter pins.

7.8 Rivets: Types of rivets. specification and identification .

7.9 Pipes & Unions: Identification of & types of rigid and flexible pipes.

7.10 Springs, types of springs materials & application .

7.11 Bearing : Purpose of bearings, type of bearings & their application

7.12 Gear type & their application, driven and driving gears, belts & pulleys, chains and sprocket

7.13 Electrical cables & connectors: cable types, construction and characteristics. High tension and coaxial cables. Wiring protection techniques, Cable looming and loom support, Cable Clamps, Protective sleeving techniques

7.14 Automotive electrical and electronic control systems: Concept, Component, Symbols and drawing, Troubleshooting and Maintenance

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