THE INSTITUTE OF THE MOTOR INDUSTRY

Assessment Requirements

Unit BP26K – Knowledge of Motor Vehicle Construction and Materials

Content:

Common forms in which body repair materials are supplied

a. Identify the common forms of supply of metals to include:
   i. sheet
   ii. roll
   iii. bar
   iv. section
b. Identify common forms of supply for non metals:
   i. solid
   ii. liquid
   iii. composites
   iv. laminated

Mechanical properties and use examples of materials to illustrate these properties

a. Define the three states of matter.
b. State the definitions of the following mechanical properties:
   i. ductility
   ii. malleability
   iii. hardness
   iv. toughness
   v. elasticity
   vi. plasticity
   vii. weld ability
   viii. conductivity
   ix. insulation
c. Give examples of materials and components exhibiting the above properties.
d. Describe ways in which the above properties can be changed temporarily or permanently to include:
   i. heating
   ii. alloying
   iii. cold working
   iv. heat treatments

Define and distinguish between classes of materials

a. Define classes of materials as:
   i. metals
   ii. non metals
   iii. synthetic
   iv. natural
b. Classify metals into:
   i. ferrous
   ii. non ferrous
   iii. pure metals
   iv. alloys

Factors which affect the selection of listed materials

a. Identify the range of selection factors which determine the use of materials to include:
   i. material costs
   ii. suitability for use
   iii. form of supply

   iv. joining characteristics
   v. strength
   vi. material properties
   vii. corrosion resistance
   viii. melting point

b. Compare the factors affecting the use of:
   i. pure metals
   ii. alloys
   iii. plastics

c. Understand the Importance of melting points of the following:
   i. LC steel
   ii. aluminium alloy
   iii. stainless steel
   iv. solder
   v. common plastics

Listed materials used in repair or construction

a. Identify the types and properties of steels used in construction and repair to include:
   i. low carbon steels
   ii. medium carbon steels
   iii. high carbon steels
   iv. cast irons
   v. alloy steels
   vi. UHSS

b. Describe the properties of common non ferrous metals used in construction and repair to include:
   i. aluminium
   ii. zinc
   iii. lead
   iv. tin
   v. copper

c. Compare and identify listed non-metals used in repair or construction to include:
   i. plastics
   ii. glass
   iii. fabrics
   iv. leather
   v. rubber

d. Define the terms:
   i. thermo plastic
   ii. thermo setting plastics

e. Identify the uses and properties of materials used for interior furnishings such as:
   i. rubber
   ii. fabric
   iii. leather
   iv. glass

f. Give examples of common plastics used in repair and construction including:
   i. ABS
   ii. polyethylene
   iii. polypropylene
   iv. polyester
   v. acrylic
   vi. glass reinforced plastic

State the constituents and general properties of the following alloys:

   i. solder
   ii. stainless steel

iii. low carbon steel
iv. brass
v. aluminium alloys including duralumin

Ways in which the properties of metals can be changed temporarily of permanently

a. Explain the advantages of changing the material properties temporarily
b. Explain the effects of changing the material properties permanently
c. State the advantages of changing materials properties
d. State that material properties can be changed by:
   i. heat treatment
   ii. cold working
   iii. alloying
e. Describe how the properties of metals are changed under the above three headings

Causes of corrosion in steel car bodies

a. Explain the principle of oxidation to include:
   i. simple corrosion cell
   ii. combination with oxygen
   iii. effects of an electrolyte
   iv. effects of dissimilar metals
b. Identify reasons for corrosion in vehicles to include:
   i. bad joint design
   ii. poor protection
   iii. stone chips
   iv. water leaks
   v. industrial pollution
c. Explain that methods of corrosion protection can include:
   i. protective metal coatings
   ii. protective non-metal coatings
   iii. cavity waxes
   iv. anti chip coatings
   v. sealers
d. Describe the effects of corrosion in a vehicle body to include:
   i. loss of strength
   ii. manufacturer's warranty consideration
   iii. loss of appearance

Characteristics of body assemblies

a. Describe methods of producing body panels to include:
   i. forming
   ii. pressing
   iii. moulding
b. Describe the methods of imparting strength to sheet metal to include:
   i. swages
   ii. edging
   iii. forming into sections
   iv. combining sections into box sections
   v. the principles of crowned panels
c. Describe the characteristics of monocoque structures.
d. Describe the characteristics of separate construction.
e. Identify by name and description of use, the following:
   i. sill panel
   ii. bulkhead
   iii. chassis leg
   iv. inner flitch

v. cross member
vi. a, b, c and d posts
vii. roof
viii. cant rail
ix. windscreen header rails
x. floor assembly
xi. inner wheel arches
xii. dog leg
xiii. scuttle panels
xiv. front panel
xv. headlamp mounting panels
xvi. back panel