

CHRISTIAN SOCIAL SERVICES COMMISSION- (CSSC)
NORTHERN ZONE JOINT EXAMINATION SYNDICATE(NZJES)



FORM TWO PRE-NATIONAL EXAMINATION AUGUST 2024
WOODWORK AND PAINTING ENGINEERING
MARKING SCHEME

SECTION A (15 MARKS)

1. Multiple Choice Answers (10 Marks)

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
B	C	D	C	C	B	B	C	C	B

2. Matching Answers (05 Marks)

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	C	F	I	A	K

SECTION B (70 MARKS)

3. (a) To describe any four (4) constituents of oil paints (08 Marks)

(i) Base

This provides body to the paint and it depends on the nature of paints to a great extent. White lead, Red lead, Zinc oxide (or zinc white), Iron Oxide, and metallic powders such as Aluminum, Copper and Bronze are the commonly used bases.

(ii) The vehicle

It is composed of the binder. The binder may be dissolved as a solution or carried as a dispersion of microscopically small particles in a liquid. Commonly used binders are linseed oil, Tung oil, poppy oil and nut oil.

(iii) Colouring pigments

These are finely ground colouring matters. Their main function is to give colour and opacity to the paint. Commonly used pigments are Lamp black, vegetable black, ivory black, Indigo, Prussian blue, Chrome yellow, raw sienna, yellow ochre, Copper sulphate, Raw umber, burnt umber, Red lead, vermilion and carmine.

(iv) Solvent or thinner

A liquid thinner increases their fluidity to the desired consistency so as to make them work more smoothly and also to help penetration of porous surfaces. Oil of turpentine is the most commonly used thinner.

(v) Drier

Driers are added to paints to quicken the drying of vehicles by absorbing oxygen. Some of the commonly used driers are: Litharge, Red lead, lead acetate, Manganese dioxide and Zinc sulphate.

(vi) Inert filler

It is an adulterant mixed to replace the base in part and thus reducing the cost of paint. Commonly used fillers are silica, charcoal, powdered chalk, aluminium silicate and barium sulphate.

(b) Places where oil paints are applicable are:

(02 Marks)

- Finishing and protection of wood in buildings
- Exposed metal structures such as ships and bridges

4. (a) The wood painting process for the new surface:

(08 Marks)

Surface Preparation

- Cleaning

The surface should be well cleaned without any dust, spots, greasy matter etc. The nails used in the woodwork should be punched up to 3mm below the surface. The wood in woodwork should be well seasoned and should not contain more than 15% of moisture content. The surface should be dry.

- Knotting

Knots present in the wood may eject resins from wood. So, knots are killed or covered in this knotting process.

Painting

- Priming

Priming is nothing but applying a prime coat or first coat on the surface. In this case, the surface is smoothened with abrasive paper and the first coat of paint is applied to fill all the pores in the surface.

- Stopping

After filling all the pores of the wooden surface in priming, the whole surfaces are rubbed with glass paper or pumice stone. This process of rubbing down the wooden surface is called stopping.

- Under Coating

Undercoating is nothing but second and third coats of good quality works which provides same look or shade as finishing coat. For better results, enough time should be allowed for each coat.

- Finishing

Finishing is the last coat applied on the surface which is generally applied on the undercoating. It should be applied in a smooth and uniform manner. It decides the whole final look of the surface; skilled workers are required for better results.

(b) The purpose of priming is:

(02 Marks)

- To give a smooth and consistent finish on masonry walls.
- To give better adhesion between the wood surface and the paint.
- To give better bonding and for protection from the moisture and corrosion on metal.

5. (a) (i) Spray painting is a painting technique where a device sprays a coating through the air onto a surface. The most common types employ compressed gas usually air to atomize and direct the paint particles. Another is Spray guns evolved from airbrushes. The two are usually distinguished by their size and the size of the spray pattern they produce.

(01 Mark)

(ii) Spray painting equipment refers to the collection of devices used to apply a surface coating to objects by the means of atomized liquids that are propelled through the air, usually by compressed air. It also refers to a series of devices used to optimize the coating application.

(01 Mark)

(iii) Spraying Equipment and their functions (Any three points) **(06 Marks)** - Air gun sprayer:

The paint is applied to an object through the use of an air-pressurized spray gun. The air gun has a nozzle, paint basin, and air compressor. When the trigger is pressed the paint mixes with the compressed air stream and is released in a fine spray.

- Electric fan:

Combine the paint with air or convert the paint to tiny droplets and accelerate these out of a nozzle.

- Airless spray guns: used by contract painters to paint heavy duty industrial, chemical, and marine coatings and linings.

- Spray booth: Originally used to paint vehicles in a body shop.

(b) Benefits of using paint sprayers over conventional painting **(02 Marks)**

- It saves time
- High accessibility
- Even and smooth finish
- Ease of Use

6. (a) Things that the good design pattern is supposed to provide: **(04 Marks)**

- Should show appropriateness to the material in which it is developed.
- Must be flexible to identify the same patterns as different.
- Must be flexible to identify the same patterns as different.
- Should have quick spreading Speed
- Should possess accuracy at the end of the dyeing

(b) Identify any two (2) materials which are used for tie and dye **(06 Marks)**

- Roll of cotton wool: This is a base material for making textile
- Dye material: This is the organic material giving colour to the textile
- Salt: This is a chemical material used to stick dye in fabric (cotton wool)
- Gas: This is a modern source of heat used for heating chemicals
- Soda ash: This is a chemical for washing and cleaning of materials and equipment

7. (a) Activities which are practiced in woodwork and painting workshop **(02 Marks)**

- Carpentry: This is skilled trade and a craft in which the primary work performed is the cutting, shaping and installation of building materials

- Wood turning: This is the art or process of fashioning wooden pieces or blocks into various forms and shapes by means of a lathe.
- Wood carving: This is the art of fashioning or ornamenting objects of wood by cutting with a sharp handheld implement
- Sanding: This refers to the process of abrading wood fibers so that they are rendered uniformly rough or smooth.
- Varnishing: refers to a liquid preparation that when applied to a surface dries to form a hard lustrous typically transparent coating.

(b) Differentiate between woodwork workshop and painting workshop.

S.N	Woodwork Workshop	Painting Workshop
1.	Used for manufacturing	Used for finishing
2.	Materials used are wood	Materials used are colors, pigment, oil, water and powder
3.	Tools and Machines used are hammer, tape measure, utility knife, band saw, planer, jointer etc.	Tools and Machines used are painting brushes, rollers, tray, sleeve, step ladder and compressors
4.	Equipped with heavy duty machineries	Equipped with simple machineries

8. (a) Eye injury first aid

(05 Marks)

- Hold your eye open
- Use cotton wool to remove any particle
- Wash the eye with water
- Apply eye drop
- See doctor for treatment

(b) First Aid treatment for the fractured hand

(05 Marks)

- Stop any bleeding.
- Immobilize the injured area
- Apply ice packs to limit swelling and help relieve pain.
- Treat for shock.
- See doctor for treatment

9 (a) Procedures of applying varnish

Surface Preparation for Varnish

(03 Marks) -

All dust and dirt should be removed from the surface.

- The cracks and holes should be cleaned of dust and be filled with wood putty.
- The surfaces should be finished smooth with the help of carpenter's plane.
- Previous coats of paint or stain, if any, should be allowed to dry and be rubbed down lightly and washed off.
- For exterior work, a normal dry day should be chosen because exposure to extreme heat, cold or damp atmosphere will spoil the work.
- While applying varnish, care should be taken to avoid forming fume or air bubbles. Brushes and containers should be kept clean.

Application of Varnish

(04 Marks)

- Two or three coats of clear varnish should be applied for durable finish.
- Next coat should be allowed when previous coat becomes dry.
- The varnish should be applied with full brush and be spread evenly with short light strokes.
- If the work is vertical, the varnish should be crossed and re-crossed and then laid off lightly.
- It should be completed with upward brushing so that varnish could set, flow down and eliminate brush marks.

- If the surface is horizontal, the varnish is worked in every direction with light quick strokes.
- It should be finished in one definite direction so that it could set without showing brush marks.
- The surface should be rubbed down after each coat with fine sand paper except final coat.
- The finished surface should present an even look and fine glossy surface free from stripes, swelling, etc.

(b) To describe three (3) ingredients of varnish

(03 Marks)

(i) Resins

Resins are used to bind together the ingredients. These include: poly vinyl acetate, butyl methacrylate and methyl.

(ii) Solvents

Solvents such as water and mineral turpentine are used to dilute and thin the varnishes.

(iii) Driers

Driers are added to varnishes to quicken the drying of vehicles. Linseed oil dries by absorbing oxygen and it could be expedited by adding substances rich in oxygen. Some of the commonly used driers are: Litharge, Red lead, lead acetate, Manganese dioxide and Zinc sulphate.

SECTION C (15 MARKS)

10 (a) Required to calculate the cost of materials

Solution:

Given Data

- Total surface area = 3000 m²

- Capacity of painting = 2.0 litres per 1.5 m²

- Price per litre = Tshs. 9,000/=

(02₁ Marks)

2

Required to determine the cost of materials

If 1.5 m² 2.0 litres

≡

3000 m² ≡ ?

= $\frac{3000 \times 2}{1.5}$

1.5

= 4000 Litres

(04 Marks)

Cost = 4000 x 9000

= Tshs. 36,000,000/=

(02₁ Marks)

2

(b) Required to estimate the labor charge

Labour cost = 4% x 36,000,000/=

= Tshs. 1,440,000/=

(02 Marks)

(c) Required to estimate the new material cost and labor charge if the initial material cost increased by 0.5

New Material cost = 1.5 x 36,000,000

= Tshs. 54,000,000/=

(02 Marks)

Labour cost = 4% x 54,000,000/=

= Tshs. 2,160,000/=

(02 Marks)