

SIR ARTHUR LEWIS CO

DIVISION OF TECHNICAL EDUCATION AND MANAGEMENT STUDIES

EXIMINATION SESSION : May 2015 Final Examination
 TUTOR(S) : Ms. Crescentiana Charles
 PROGRAMME TITLE : Architectural Technology
 PROGRAMME CODE(S) : 3BD-ART-AD
 COURSE TITLE : Building Services
 COURSE CODE(S) : BLT 109
 CLASS (ES) : Year 2
 DATE : Tuesday 12th May, 2015
 TIME : 9:00 am
 DURATION : 3 hrs
 ROOM : TRB-R4
 INVIGILATOR(S) : O. Lindberg, F. Joseph; S. Auguste



B36

INSTRUCTIONS:

This paper contains a hundred (100) multiple choice questions. Students are required to answer **all** questions.

- Commence each answer on a new page
- Please number your responses accurately.
- Students are advised to use a pen to write this examination.
- Write your ID Number on *each* answer sheet.
- All cell phones must be turned off during the examination.
- **Note:** Bags, books as well as writing paper not given by the invigilator should be deposited at the front of the examination room or as otherwise indicated.
- Students must sign **IN** and **OUT** on the examination class list.

Building Services

BLT 109

Multiple Choice Final Examinations

Ques. 1.

A 'separate' system of drainage is where?

- a. W.C and bath wastes run separately to the R. W pipes.
- b. House has its own separate disposal arrangement for waste
- c. Separate drainage pipes are used for each fitting
- d. Rainwater and foul water travel in separate pipes.

Ques. 2.

The fall on a drain should be such that the effluent is cleared away. This action is called?

- a. Mean water level
- b. Self pipe alignment
- c. Self cleaning velocity
- d. Mean efficiency gradient

Using the diagram below and answer questions 3 and 4. Each question has ONLY on correct answer.

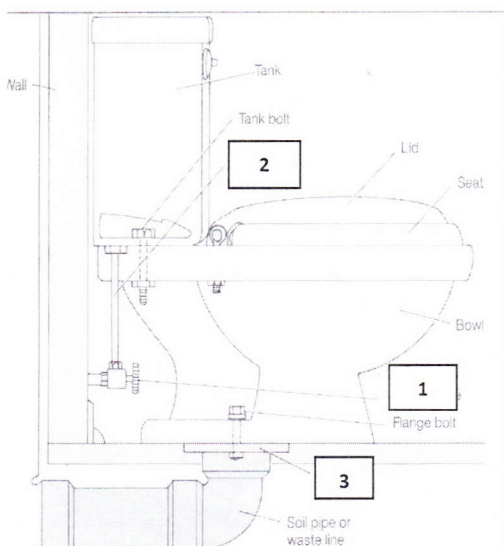


Fig: 3.1

Ques. 3.

The Diagram above illustrates what type of water closet?

- a. P Trap
- b. S Trap
- c. Combined
- d. None of the above
- e.

Ques. 4.

In the Diagram (Fig 3.1) the parts of the water closet labelled 1, 2 and 3 are as follows

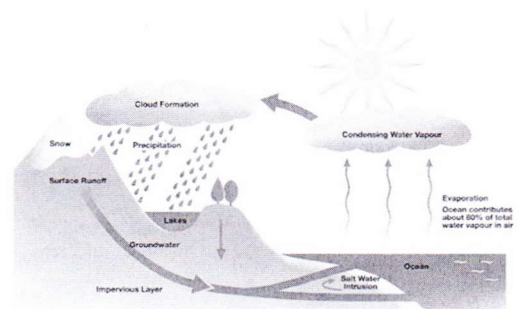
- a. Stop valve, Supply Tube, Flange
- b. Stop Cork, Nuts, Supply Tube
- c. Stop Valve. Supply Tube,
- d. None of the Above

Ques. 5.

A rectangular gate is 1.6m wide and is retaining water to a depth of 800mm. Calculate the sideways thrust on the gate produced by the water, given the density of the water is 1000kg/m^3 and gravitational acceleration is 9.8m/s^2 .

- a. 2053 Pa
- b. 546 N
- c. 5023N
- d. 3924 Pa

Ques. 6.



The Diagram above illustrates

- a. The precipitation cycle
- b. The chemical effect
- c. The hydrological cycle
- d. The characteristics of water.

Ques. 7.

A storage tank measures 2m x 2m is filled to a depth of 1.5 meters in 5 minutes by a supply pipe with a diameter of 100mm which runs full bore. Calculate the flow rate in the pipe.

- a. 324 Pa
- b. $0.02\text{ m}^3/\text{s}$
- c. $2.54\text{ m}^3/\text{s}$
- d. $5.2\text{ m}^3/\text{s}$

Ques. 8.

From the list below indicate which answer is NOT a category for fire-fighting equipment is:

- a. Sprinklers and other fixed water sprays
- b. Fixed wet and dry risers
- c. Portable extinguishers
- d. Doors and windows smoke alarms

Ques. 9.

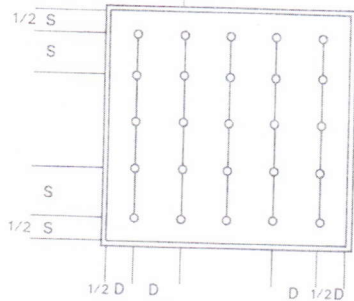


Fig. 9.1

Fig.9.1 above illustrates which spacing arrangements

- a. Wet Jet System
- b. Sprinkler System
- c. Multi-jet System
- d. All of the Above.

Ques. 10.

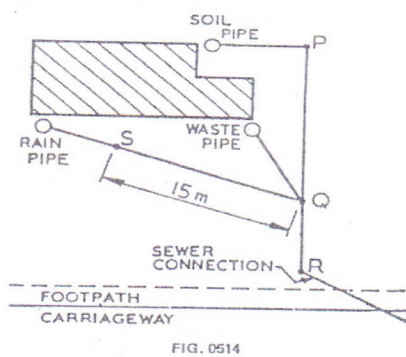


FIG. 0514

At which point would it be necessary to provide an inspection chamber on the drain shown in Fig 0514

- a. Q and R
- b. P, Q and R
- c. Q, R and S
- d. P and R

Ques. 12.

Heat is distributed by the water of a simple gravity hot water system by

- a. Irradiation
- b. Radiation
- c. Conduction
- d. Convection

Ques. 13.

The recommended voltage rating of electric hand tools on a construction sites is

- a. 415
- b. 240
- c. 110
- d. 55

Ques. 14.

Which one of the following pipeline material, under similar condition, would offer the greatest resistance to damage by frost?

- a. Low carbon steel
- b. Copper
- c. Polyethylene
- d. Cast Iron

Ques. 15.

The term 'water table' refers to

- a. The depth at which water is encountered during excavation works
- b. The height at which water will be extracted by capillary action
- c. The mean sea level measured at the nearest coast line
- d. An imaginary line measured one meter below ground level

Ques. 16.

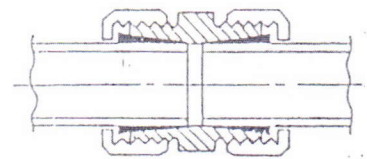


FIG. 0518

The type of pipe joint shown in the section in Fig. 0518 is?

- a. Compression
- b. Capillary
- c. 'O'-ring
- d. Screwed and socket

Ques. 17.

When several passenger lifts are to be installed in a building it is better to?

- a. Separate the passenger cabs
- b. Group them together in a lobby
- c. Spread them throughout the length of the building
- d. Offset the lifts by the population of the building.

Ques. 18.

A combined system of drainage is one where?

- a. Two or more systems are serviced by the same drain
- b. Soil and surface water are collected into a single drain
- c. Soil drains and surface water drains are laid in the same trench
- d. Soil drainage from W.C. is combined with waste water from the sink.

Ques. 19.

Traps are used in a drainage system are as follows?

- a. As an access point for rodding.
- b. As an inlet point for soil pipes
- c. To collect surface water
- d. To prevent pollution of the atmosphere.

Ques. 20.

Connecting a circuit between a single live cable and a neutral cable would produce

- a. Single-phase supply
- b. Two-phase supply
- c. Three-phase supply
- d. Four-phase supply

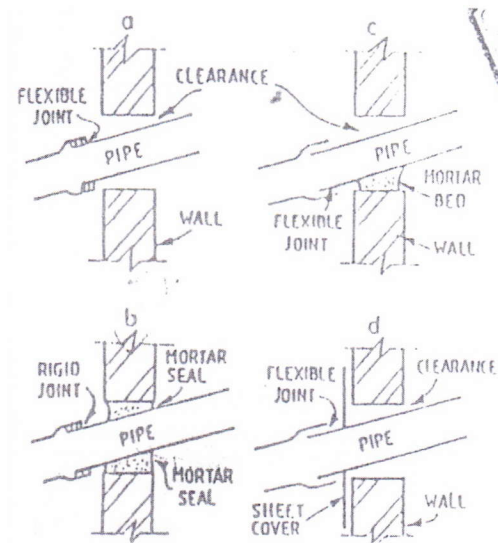
Ques. 21.

A requirement for surface water drains in a combined system of drainage is that they?

- a. Need to be trapped
- b. Need to be vented
- c. Must have manholes
- d. Have a minimum fall of 1 in 40

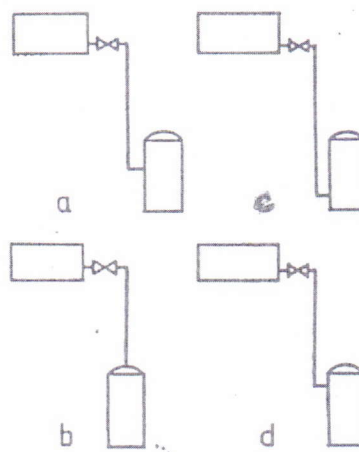
Ques. 22.

Which of the following arrangements for vitreous clay drainage pipe passing through substructure walls is the most satisfactory?



Ques. 23.

The cold feed to an ordinary direct hot water cylinder should be as indicated at



Ques. 24.

The cold water supply system shown in Fig. 1.7 it is considered to be a

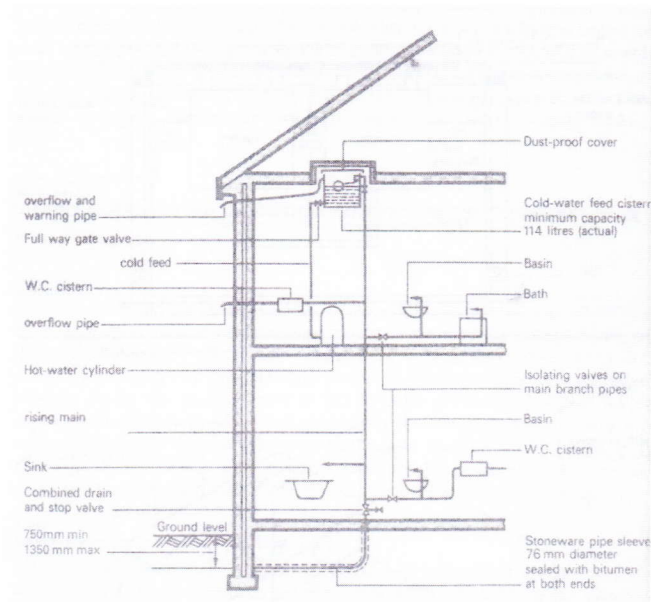


Fig. 1.7

- a. Direct system
- b. Indirect system
- c. Intermittent system
- d. Tank and cylinder system

Ques. 25.

Select the correct statement about solar energy

- a. Flat plate collectors absorb only direct radiation
- b. Flat plate collectors should ideally be oriented due south but a variation up to 45° either side of due south will not appreciably reduce the collector's efficiency
- c. Water is the most common medium for heat transfer and storage in solar systems
- d. Supplying 100% of the hot water requirement by solar heating is usually economically feasible.

Ques. 26.

When water freezes in a copper plumbing system which one of the following is most likely to fail?

- a. Pipe walls
- b. Bibcock
- c. Pipe clips
- d. Compression joints

Ques. 27.

The recommended minimum diameter for the waste pipe from a bathroom shower is?

- a. 25mm
- b. 32mm
- c. 38mm
- d. 44mm

Ques. 28.

Electricity distribution networks are done via a

- a. Grid system
- b. Transformer system
- c. Spherical system
- d. None of the above

Ques. 29.

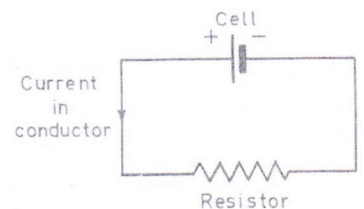


Figure 7.1

Fig. 7.1 shows an example of a?

- a. A lamp circuit in series
- b. Ammeter
- c. A simple circuit
- d. A simple magnetic field

Ques. 30.

Which one of the following is a soil appliance?

- a. Shower
- b. Bath
- c. Bidet
- d. Urinal

Ques. 31.

In order to provide the most efficient fire-extinguishing agent, fire risks are classified in four groups Class A (Carbonaceous materials) Class B (Fires in inflammable liquids) Class C Fires (Fires in inflammable gases) Class D (Fires in inflammable metals). From the list below which is the best extinguishing agent for Class A fires?

- a. Dry Powder
- b. Dry sand and dry powder
- c. Carbon dioxide and acid
- d. Water and dry powder

Ques. 32.

When identifying and assessing a building for sustainability the following factors should be considered.

Item	Identifying Factors
a	Use of land; Use of Material; Use of energy
b	Use of water; Reduction of water; Community of benefits
c	Life cycle of services; Effective the thermal insulation of the building
d	All of the Above

Ques. 33.

Rainwater pipes in a combined drainage system must discharge through a

- a. Slow bend
- b. Trapped gully
- c. Soak away
- d. Backdrop manhole

Ques. 34.

When laying a drainage system a flexible bed is used in order to?

- a. Allow settlement in a building
- b. Accommodate the movement in drainage pipes
- c. Accommodate wall plates movements in roots
- d. Allow expansion in heating pipes

Ques. 35.

Which one of the following is the **most** common form of electrical distribution for domestic housing?

- a. One-phase 2 wire
- b. Two-phase 3 wire
- c. Three-phase 4 wire
- d. Four-phase 5 wire

Ques. 36.

Refer to Fig. X. A ventilation pipe would be included in the drainage system at point?

- a. 1
- b. 2
- c. 3
- d. 4

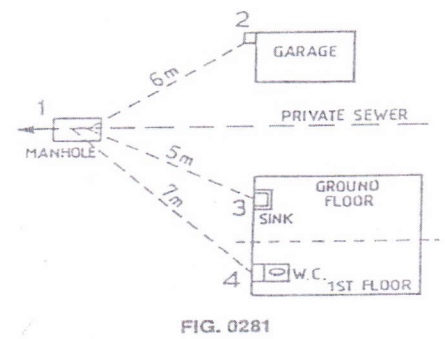
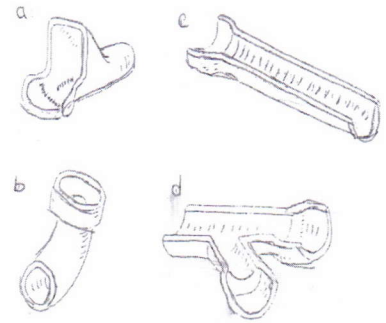


FIG. 0281

Ques. 37.

Which one of the following sketches illustrates a drain chute?

- a. 1
- b. 2
- c. 3
- d. 4



Ques. 38.

Fig. 0744 shows the section through the base of an inspector chamber. The concrete indicated at A is called the?

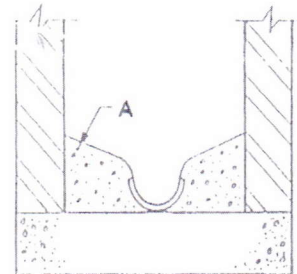


FIG. 0744

- a. Haunching
- b. Flaunching
- c. Channeling
- d. Benching

Ques. 39.

The efficiency of a sprinkler system depends largely upon the source of water supply, which should be adequate for the size and type of building protected. From the list below select the best water supply for a five (5) storey office building.

- a. Town main
- b. Gravity tank
- c. Town main, automatic tank and gravity tank.
- d. Water drawing from a river or canal.

Ques. 40.

The table below (Fig 53.1) highlights the characteristics of a pipe sprinkler system. From the list below select which one is the most accurate description of a wet pipe sprinkler system:

Item	Sprinkler System Characteristics
a	Contains water under pressure; Heads open automatically in the event of fire; Water discharge is continuous;
b	Provides a continuous discharge of air; This system is used where the water is subjected to freezing;
c	Contains pressurized air; Water is controlled by an automatic and very sensitive valve;
d	A and C only

FIG 53.1

Ques. 41.

Which one of the following properties would you expect to find in a deep source of underground water?

- a. Dissolved organic material
- b. Acidity/alkalinity traces
- c. Micro-organisms
- d. Pollutants

Ques. 42.

Pure water is never found in nature because for many minerals, water is an excellent

- a. Hydrate
- b. Coagulant
- c. Solvent
- d. Filter

Ques. 43.

Which one of the following is generally **not** used for water transportation?

- a. Rivers
- b. Aqueducts
- c. Pipelines
- d. Desalination plants

Ques. 44.

An aquifer is

- a. A surface soil which experiences heavy runoff
- b. An underground permeable material through which water flows
- c. The boundary between the zone of aeration and the zone of saturation
- d. The boundary between soil layers along which sliding may occur.

Ques. 45.

High voltage electricity from the power plant is broken down in the following manner to be transmitted for domestic purposes

- a. Power Plant: Substation: Transformers: Domestic Use
- b. Substation: Power lines: Transformers: Domestic Use
- c. Substation: Power Plant: High Power Lines: Transformers: Domestic Use
- d. All of the above

Ques. 46.

The concept of the generator is to rotate which one of the following in a magnetic field?

- a. Coil
- b. Capacitor
- c. Resistance
- d. Magnet

Ques. 47.

The term 'hardness' as it refers to water means

- a. Water is an excellent solvent
- b. The presence of dissolved carbon dioxide increases its solvent power.
- c. It is difficult to obtain a lather with soap
- d. The water contains high levels of dangerous solutions.

Ques. 48.

What is the main purpose of an extraction vent system?

- a. Limiting the amount of smoke within an area.
- b. For the easy and quick removal of smoke within a space.
- c. Allowing fresh air to mix with the smoke to prevent affixation
- d. To cool the hot air in the space.

Ques. 49.

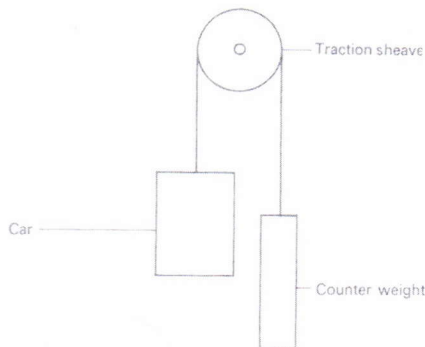
Open storm drainage systems are preferred to closed systems because

- a. They are less expensive
- b. They have a greater capacity
- c. Their gradients are more flexible
- d. They eliminate standing water

Ques. 50.

The following diagram illustrates the roping arrangements for a?

- a. Double cab pulley system
- b. Single wrap for a small cab
- c. A single counterweighted double wrap traction system
- d. Four cars roping systems



Ques. 51.

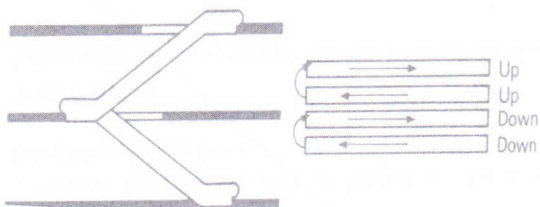


Fig: 0.761

The diagram Fig 0.761 above illustrates which type of escalator system?

- a. Crisscross escalator
- b. Parallel escalator
- c. Single bank escalator
- d. Double bank single escalator

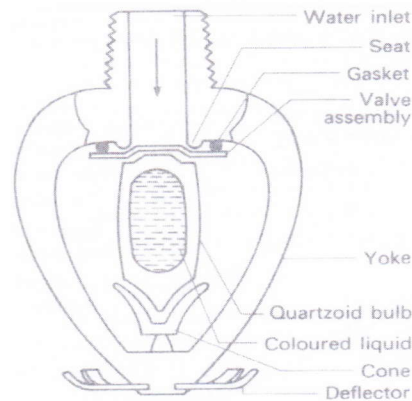
Ques. 52.

Designing buildings to conserve energy has assumed great importance in recent years. In this regard, which of the following statements is incorrect?

- a. A rectangular building absorbs less solar heat in the summer and more in the winter, if its longest axis is in an east-west, rather than a north-south direction.
- b. A triangular building, with its base facing north and its apex facing south, is energy-efficient in a hot climate
- c. A building on a north facing slope experience heavier heating loads in winter, but lighter air conditioning loads in summer, as compared to buildings on other slopes
- d. In a cold climate, a small amount of glazing in the north wall is preferable to no glass at all because it would allow heat gains from diffused radiation.

Ques. 53.

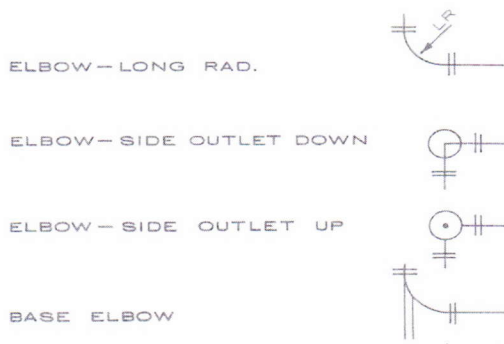
The following illustrates which type of sprinkler head?



- a. Side wall sprinkler head
- b. Strut sprinkler head
- c. Grinnelle-type quartzoid sprinkler head
- d. Duraspeed sprinkler head

Ques. 54.

The diagram below illustrates what type of fittings.



- a. Fire installations fittings
- b. Plumbing Fittings
- c. Heating pipes fittings
- d. Air Conditioning fittings

Ques. 55.

Timer control, Daylight control, Local switching and Occupation control and are factors and parameters for

- a. Light loss factor
- b. Layout of luminaires
- c. Lighting control
- d. Glare Index

Ques. 56.

The main function of artificial lighting can be summarized as follows

Functions of lighting			
a	b	c	d
Task	Luminous efficacy	Temperature	Tungsten
Movement	Life	Brass	Reflecting
Display	Colour	Copper	Polar curves

Ques. 57.

The best material one can use for the erection of an external fire escape stair is

- a. Stainless steel
- b. Aluminum
- c. Copper
- d. Cast Iron

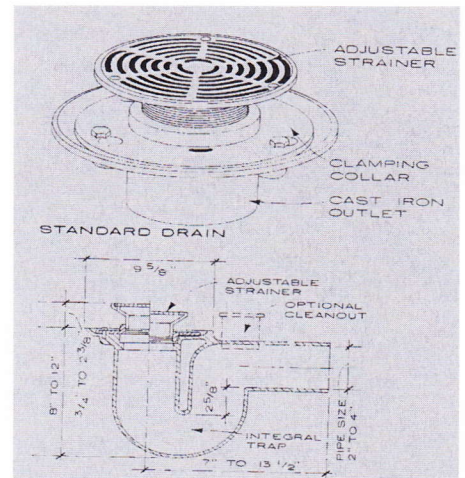
Ques. 58.

The consideration needed for an effective evacuation plan constitutes of the following; Select the best possible answer

Evacuation Plan	
a	Proper fire rated doors: Clearly labeled exits: Safe assembly areas; Proper signage. Sprinkler
b	External fire escape poles, Proper fire rated doors for 5 minutes:
c	Fire extinguishers; Clearly labeled exits: Safe assembly areas; Smoke filled vents.
d	Clearly labeled exits: Sand; Axe and Flour.

Ques. 59.

The standard drain as seen below is best used for?



- a. Water closet
- b. Face Basin
- c. Kitchen sink
- d. Shower

Ques. 60.

Of the following listed below identify which one is **NOT** a substation located in St. Lucia.

- a. Jeremie Street, Castries
- b. Cas en Bas, Gros Islet
- c. Praslin, Dennery
- d. Victoria. Choiseul

Ques. 61.

Daylight usually enters a building by means of windows and skylights therefore the provision of natural lighting in a building needs to be considered together with factors of artificial lighting, heating ventilation and sound control. The quantity of natural lighting inside a room is governed by the following factors

Definitions	
a	The nature and brightness of the sky
b	The size, shape and position of the windows
c	Reflections from the surface in the environment
d	Use of the daylight factor measurement

- a. A only
- b. A and B
- c. D only
- d. A, B and D

Ques. 62.

Which of the following listed below best defines the term “escalator”?

- I. Escalators are continuous conveyors designed for moving large number of people
 - II. Escalators have the advantage of being reversible to suit the main flow of traffic during peak hours.
 - III. The carrying capacity of an escalator is depends upon the speed along the line of inclination.
 - IV. Speeds may vary between 0.45m/s and 0.6m/s.
- a. I only
 - b. III only
 - c. II and III
 - d. I, II, III and IV

Ques. 63.

The diagram Fig 0102.1 illustrates the parts of a typical kitchen faucet below. From the list below select the part labeled 1, 2 and 3 which are missing from the illustration.

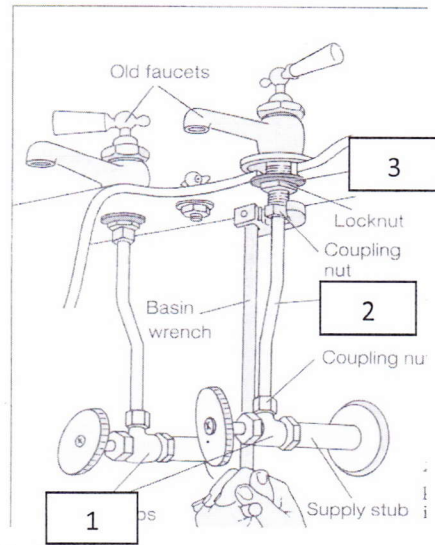


Fig 0102.1

- a. Supply stops, supply tube and washer
- b. Basin wrench supply stops and coupling
- c. Supply tube, locknut, PVC water line
- d. Supply stub, faucets, washer

Ques. 64.

The purpose of a service duct is to:

- I. To hide services and to facilitate inspection and repair.
 - II. To reduce noise and protect services from damage.
 - III. Point of entry to the service duct should be not be near the roadways
 - IV. Information for the local buildings authorities should influence the location of services.
- a. I only
 - b. III only
 - c. II and III
 - d. I, II and VI

Ques. 65.

The three energy components possessed by moving liquid is made up of?

- Potential , Pressure and Static Energy
- Potential Pressure and Kinetic Energy
- Potential, Electrical and Kinetic Energy
- Solar, Pressure and Potential Energy

Ques. 66.











 Electrical switchbox	 Single Pole Switch
 Three-Way Switch	 SinglePlex Receptacle
 Duplex Receptacle	 Duplex Receptacle WP= Waterproof
 GFCI Duplex Receptacle	 Isolated Ground Receptacle
 Switched Receptacle	 FourPlex Four Gang Receptacle

Fig 105.1

The diagram Fig 105.1 illustrates?

- Architectural symbols
- Engineering Symbols
- Blueprint Electrical symbols
- Mechanical symbols

For the questions 67 through 75, select the correct answers from the key list below. Each question has ONLY one correct answer.

- A0. Three phase**
- A1. Load**
- A2. Alternating Current**
- A3. Current**
- A4. Conductor**
- A5. Grid**
- A6. Fuse**
- A7. Fluorescent Lamp**
- A8. Earth**
- A9. Distribution Board**
- A10. High Voltage**
- A11. Ohm**
- A12. Load factor**
- A13. Insulator**
- A14. Discharge lamp**
- A15. Diversity factor**

Ques. 67.

A current which may start at zero, increase to reach maximum, fall away to zero and then increase to an equal but opposite maximum and fall away again to zero.

Ques. 68.

A substance that allows an electrical current to pass through it relatively freely.

Ques. 69.

The power supplied to a building or a piece of apparatus or the power delivered by a generator.

Ques. 70.

This means that there are three separate single-phase supplies out of step with each other by 120 ° produced by an alternating current generator.

Ques. 71.

A safety device consisting of a short length of relatively fine wire in a suitable holder.

Ques. 72.

The high-voltage transmission system operated by the electrical company.

Ques. 73.

A connection with the ground made in such a manner that an immediate and safe discharge of electrical energy is ensured

Ques. 74.

The movement or passage of electricity along a conductor.

Ques.75.

A tubular discharge lamp internally coated with that fluoresces under the action of an electrical discharge, producing a white light.

Section B: Science Long Answer

**Read each question carefully and answer on the sheet provided.
Students must answer ALL QUESTIONS in this section.**

1

- (a) Calculate the capacity and the number septic tanks (holding tanks) to be used for the following conditions
- Residential apartment with contains 2 floors
 - Each floor contains 4 apartments
 - Each apartment can hold a maximum of 6 persons.
- NB: Please justify your answer using appropriate and technical evidence. (15 marks)**
- (b) Determine the design flow rate for a cold water distributing pipe supplying 20 water closets, 24 wash basins, 10 urinals, 6 showers and 4 cleaners' sink in a factory where there is a high peak demand for the use of showers,
- Where the urinals would require flushing every 20 minutes and each urinal requires 4.50 liters to flush. **(15 marks)**
- (c) Define the term **“Air Conditioning”** and list five (5) essential features for a successful air-conditioning plant. **(10 marks)**
- (d) In no more than 150 words compare the use of natural ventilation with that of mechanical ventilation stating the conditions which merit their use **(15marks)**
- (e) In winter, air at a dry bulb temperature of 5°C and 60 % relative humidity enters a building through a heating battery and is heated to a dry bulb temperature of 20°C without adding moisture.
- From the chart find:
 - Wet bulb temperature of the incoming air
 - The relatively humidity of the heated air. **(5marks)**
- (f) Define and explain the following terms;
- “Three Phase Electricity”
 - “Excess Current **(10 marks)**
- (g) The total surface area of footpaths and roadways of a building development schemes found to be 4000 m². Calculate the diameter of the main surface water drain using the following data:
- Rainfall intensity 50mm/hr
 - Impermeable factor of surface 0.9
 - Full bore discharge
 - Velocity of flow required 0.8 m/s **(20 marks)**

END OF EXAMINATION!