**Q1)**

 Make a comparison between ; cleat wiring , lead sheathed wiring , and conduit pipe wiring systems of electrical installation.

**Q2)**

 Find the total saving in electrical load and percentage increase in illumination if instead of using twelve 150w lamps , we use twelve 80 w fluorescent tubes. It may be assumed that:

1. There is choke loss of 25 percent of rated florescent wattage.
2. Average luminous efficiency for each lamp is 15 Lm/w and for each tube is 40 Lm/w.
3. Assume the area =A . all coefficients (C .u, D.F ,……etc) remains the same in both cases.

**Q3)**

Sketch and explain the plate earthing method , why this method is the best in Iraq for summer season compared with pipe earthing method.

**Q4)**

 what is the duty of main panel in the large building

**Q5)**

 explain the function of molded case circuit breaker(MCCB).

**Q6)**

 A room (8x12)m is lighted by 15 lamps to fairly uniform illumination of 100Lm/m2 . Calculate the utilization coefficient of the room , given that the out put of each lamp is 1600 Lumens.

**Q7)**

 Explain the earthing method through the water main pipes , in which type of pipes this method will not be effective.

**Q8)**

 Explain the basic parts (divisions) of residential electrical system.

**Q9)**

 A football pitch (120x60)m is to be illuminated for night play by similar banks of equal 1000 w lamps supported on twelve towers which are distributed around the ground of the pitch .Assuming that 40% of the total light emitted reaches the playing pitch and that an illmintion of 1000 Lm/m2 is necessary for television purposes, Calculate the number of lamps on each tower. The over all efficiency of the lamp is to be taken as 30 Lm/w.

 **Q10)** Show the difference between Neutral and earth wire.

**Q11)**

 Explain the insulation test between line (hot) conductors for electrical wiring installation.

**Q12)**

 4 lamps spaced 10m a part and suspended at the height of 5 m above the floor . If each lamp gives 200 c.p. in all directions below the horizontal .Find the illumination at the midway point on the floor between the second and the third lamps.

**Q13)**

 For absolutely safe from shock in earthing system we make "Bonding connections " illustrate that using the equivalent electrical circuit .

 **Q14)**

 Name the main differences between the following: (cleat, leadsheated , pipe) wiring systems .

 **Q15)**

A light is placed 3m above the ground and its candle power is 100 cosϴ in any downward direction making an angle ϴ with the vertical. If P and Q are two points on the ground, P being vertically under the light and the distance PQ is 3m. Calculate:

 The illumination of the light on the ground at point P and Q.

**Q16)**

 Explain the pipe earthing method , what is the main disadvantage of this method.

**Q17)**

 Name the various types of electric service switch and explain the double-pole breakers.

 **Q18)**

 A factory ,(120x40)m , with a height of 7m , illumination which we need is 60 lux. find the number , location and mounting height of 40w fluorescent tubes giving 45 Lm/w ,depreciation factor=1/1.2 and utilization factor=0.5, use twin-tube fittings .

**Q19)**

 Which type of pipes you can use only in earthing through a water main , using a diagram to explain this method .

**Q20)**

 Illustrate the function of 3- pole and 4 -pole molded case circuit breaker.

**Q21)**

 Find the total saving in electrical load and percentage increase in illumination if instead of using twelve 150w lamps, we use twelve 80w fluorescent tubes . it may be assumed that :

1. There is choke loss of 25 percent of rated fluorescent wattage .
2. Average luminous efficiency for each lamp is 15 Lm/W and for each tube is 40 Lm/w.
3. Assume all coefficients remains the same.

 **Q22)**

 Sketch and explain the function of 0.3 amps leakage current circuit breaker system.

**Q23)**

 Name the five basic divisions of electrical system for any building.

**Q24)**

 A school classroom , (7 x 10 )m, 4 meter high is to be illuminated to 135 Lm/m2 on the working plane . If the coefficient of utilization is 0.45 and the sources give 13 lumens per watt , work out the total wattage required , assuming a depreciation factor is 0.8.

Sketch roughly the plan of the room , showing suitable positions for the fittings.

**Q25)**

 Represent the electrical circuit for :

1. Earthed electrical device.
2. An unearthed electrical device .

Write down all the necessary equations when the user stand on ground touch this apparatus.

**Q26)**

 Explain how can you design the main panel circuit-breakers number.

**Q27)**

 A drawing hall in an engineering college is to be provided with a lighting installation. The hall is (30 x 20)m , 8 meter high , the mounting heights is 5m and the required level of illumination is 144 Lm/m2.

 Using lamps , estimate the size and number of single lamp luminaries and also draw their spacing layout . Assuming utilizing factor = 0.6, maintenance factor = 0.75 ; space height ratio =1 , lumens per watt for 300 w lamp = 13 , lumens per watt for 500 w lamp =16.

**Q28)**

 Explain the term "Bonding connections " and the salient feature for this type of electrical connection.

**Q29)**

 Sketch the main distribution panel board to explain the function of all elements.

**Q30)**

 Two lamps (A) and (B) of 200 candela and 400 candela respectively ,the height of (A) above the ground level is (10 m ) and that of (B) is (20 m ) . The horizontal distance between points (A) and (B) is (100 m) ,Find the illumination on the ground at midpoint between (A) and (B) .

**Q31)**

Explain the earthing method through a water main pipe .

**Q32)**

 To prevent leakage's current from the hot lines to ground , we must run a test before conducting , using circuit diagram , name and explain this test.

**Q33)**

 A shop measuring 15m by 35m , is illuminated by 20 lamps of 500 watt for each . The luminous efficiency for each lamp is 15Lm/watt, with a depreciation factor 0.7 , and a coefficient of utilization 0.5 , Calculate the illumination on the working plane .

**Q34)**

Explain the two-part of grounding system .

**Q35)**

Draw the equivalent electrical circuit to illustrate the term "Bounding connections ".

**Q36)**

 Prove that a pipe wiring system is the best type for electrical installation ,name all the differences between various wiring system types.

**Q37)**

 A minimum illumination of 80 Lm/m2 is required in a factory of 50m x 12m . Calculate the number, the location, and wattage of the lamps to be used. Assume that the deprecation factor is 0.8, coefficient of utilization is 0.4 and efficiency of each lamp is 18 lumen / watt.

**Q38)**

 Name the types of earthing electrode, and explain the plate electrode method which used for earthing .

**Q39)**

 Sketch , and explain the function of main distribution board of the building, name all

 The Panel elements.

**Q40)**

 A room(20\*10)m is illuminated by 10 lamps and average illumination is 50 lux.

 If the utilization factor and depreciation factor are 0.5 and 1.2 respectively.

 Calculate the mean spherical candle power of each lamp.

**Q41)**

 The earthing system consist two parts , explain the function and the location

 Of each one.

**Q42)**

 Build comparison table to illustrate the difference between isolator and over current circuit breaker.

**Q43)**

 It is desired to light the front of a building 42m wide and 16m high , projectors of $30^{o}$ beam spread and 1000 W lamps giving 20 Lumen/watt are available . If the desired level of illumination is 75 Lm/m2 and if the projectors are to be located at ground level 17 meter a way design and show a suitable scheme .

 Assume :

Coefficient of utilization=0.4 ; depreciation factor = 1.3; waste – light factor =1.2 .

**Q44)**

 With the aid of diagram , explain the function of main circuit breaker which is earthed leakage of 0.03 Amps.

**Q45)**

Name the functions of Molded Case Circuit Breakers.

**Q46)**

Explain the location and duty of neutral conductor wire.

**Q47)**

 A school class room of (40x25x6) m with an average illumination of 90 Lm/m2 on a working plane of 1 meter above the floor. Estimate the size and number of lamps with suitable mounting height. Assume Deprecation Factor(D.F.= 0.8333),Utilization Coefficient(U.F= 0.5), space height ratio of (S.H.R.= 1.2).

Size of lamps (Watts): 500 300 200

 Luminous Efficiency: 20 18 16

**Q48)**

 Make comparison between neutral conductors point and earth conductor point.

**Q49)**

Explain the connection and location of the neutral conductor wire.

**Q50)**

Name the tests of wiring installation.

**Q51)**

 A factory space of (33x 13) m is to be illuminated with an average illumination of

 72 lm/m2 by 200 watt lamps. The coefficient of utilization is 0.4 and the depreciation

 Factor is (1/1.4). calculate the number of lamps required. If the lumen output of a (200)

 watt Lamp is 2.730 k lm.

**Q52)**

 Make comparison between neutral point and earth point.

 **Q53)**

Name all the items of Main Electrical distributionPanel, explain the function and duty of each one.

**Q54)**

 Estimate the number and wattage of lamps which would be required to illuminate a workshop space (60x15) m by means of lamps mounted 5 meters above the working plane. The average illumination required is about 100 Lux.

 Coefficient of utilization = 0.4; power deprecation factor = 0.8333. Luminous efficiency = 16L/Watt. Assume a spacing height ratio =1(unity).

 Sketch the spacing layout.

**Q55)**

 Show the arrangement details of plate earthing method, what is the difference between using galvanized iron (G.I) and Copper plate.

**Q56)**

Illustrate the circuit diagram to explain the insulation test between the conductors and earth.

**Q57)**

 A room (20x10) m is illuminated by 10 lamps and average illumination is 50 Lux. If the utilization factor and depreciation factor are 0.5 and 0.8333 respectively. Calculate the mean spherical candle power of each lamp.

 **Q58)**

Explain the four point method (Wenner method) to measure the earth resistance.

**Q59)**

 Using circuit diagram, name and explain the test which we must run it before conducting with the supply to prevent leakage's current from the hot lines to ground.

**Q60)**

A factory measures 50m x 30m x 6m high. A general lighting scheme is to illuminate the whole area to 500 lux maintained illuminance using 1000 watt metal halide lamps with an initial efficiency of 90 lumens per watt. Maintenance factor is 0.6 and utilization factor is 0.5. A space height ratio between 1.5 and 1 is recommended for the luminaire chosen and a mounting height of 5m over working plane is assumed. Design a suitable lighting scheme.

**Q61)**

Illustrate the electrical diagram connections of all parts of grounding system.

**Q62)**

Draw the equivalent electrical circuit to illustrate the term "Bounding connections ".

**Q62)**

Illustrate how we can design the rating and numbers of circuit – Breakers (in load, spare, and for future growth) for main distribution panel.

**Q63)** (40 ) Marks

 Two lamps A & B of 200 and 400 candela respectively, are situated 100 m apart. The height above the ground level of A is 10m and of B is 20 m. If a photo meter is placed on the ground at the line center (mid – point) joining the two lamps, calculate:

 **a**) The illumination reading of the photo meter.

  **b**) The illumination reading of the photo meter if the photo meter is placed directly under the point B of 400 candela.

 **Q64)**

Explain the plate earthing method, what is the main disadvantage of this earthing connection in the summer season.

 **Q65)**

Define the terms: "Earth electrode" and "earthing lead".

**Q66)**

For what reasons the power circuits are separated from lighting circuits.

**Q67)**

 From the Comparison Table of different Wiring System name particular seven advantages for pipe wiring type.

**Q68)**

 A room (30×15) m is to be illuminated by 15 lamps to give an average illumination of 40 Lm/m2.The utilization factor is 0.238 and the depreciation factor is 0.7143.Find the M.S.C.P (mean spherical candle power) of each lamp.

Hint: M.S.C.P (mean spherical candle power) = flux per lamp/ 4π.

**Q69)**

 Derive all the necessary equations for the following two circuits to explain the Earthing effect.



 Fig (1) Electrical system without Earthing Fig (2) Electrical system with Earthing

**Q70)**

 Draw the circuit diagram to explain the test between line conductors and earth .

**Q71)**

 A 21 cm diameter globe of dense opal glass encloses a lamp emitting 1000 lumens and has a function brightness of 0.4 L/cm2 when viewed in any direction. What would be the luminous intensity of the globe in any direction . Also find what percentage of the flux emitted by lamp is absorbed for this globe.

**Q72)**

 Explain the earthing method through a water main pipe

**Q73)**

 Illustrate the function of 3- pole and 4 -pole molded case circuit breaker.

**Q74)**

 Find the total saving in electrical load and percentage increase in illumination if instead of using twelve 150w lamps, we use twelve 80w fluorescent tubes . it may be assumed that :

1. There is choke loss of 25 percent of rated fluorescent wattage .
2. Average luminous efficiency for each lamp is 15 Lm/W and for each tube is 40 Lm/w.
3. Assume all coefficients remains the same.

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 **Q75)** Define the terms:

 "earth electrode" and "earthing lead".

**Q76)** Define the term “Neutral Conductor”.

**Q77)** Name the basic divisions of Residential Electrical Wiring system.

**Q78)** In a new Electrical wiring installations why the Pipe type is a most popular.

**Q79)**

 A Factory area is 40 m long, 20 m wide, and 8 m high. Point source Luminaires are suspended 1.5 meters below ceiling level. The working plane is 1 meter high.

 Calculate the minimum numbers of Luminaires which must be installed to conform With a recommended Space Height Ratio of (1-1.5).

**Q80)**

 Explain the Earthing through a water main, why this method not used in

 Present days.