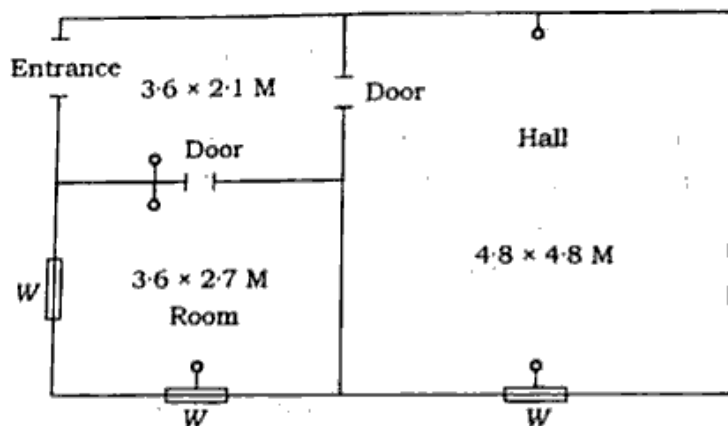


9. Draw the electrical circuit for PVC casing-capping used in a house, the plan of which is given in the figure. Assume the height of ceiling as 3.6 meter and one plug point is to be provided in each room :

akubihar



B.Tech 6th Semester Exam., 2016

UTILISATION OF ELECTRICAL POWER

Time : 3 hours

Full Marks : 70

Instructions :

- (i) All questions carry equal marks.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer (any seven) :

- (a) Quadrilateral speed-time curve is the close approximation for
 - (i) urban services
 - (ii) suburban services
 - (iii) urban/suburban services
 - (iv) main line services
- (b) Parallel operation of traction motors is easier with
 - (i) d.c. shunt motors
 - (ii) d.c. series motors
 - (iii) induction motors
 - (iv) None of the above

- (c) Which of the following will need the highest level of illumination?
- (i) Living room
 - (ii) Kitchen
 - (iii) Proof reading
 - (iv) Hospital wards
- (d) Which of the following is present inside the fluorescent tube?
- (i) Helium and oxygen
 - (ii) Argon and neon
 - (iii) Argon and carbon dioxide
 - (iv) Mercury vapour
- (e) For power factor correction in a welding circuit, a capacitor is usually connected
- (i) across the mains
 - (ii) across secondary side of welding transformer
 - (iii) across primary side of welding transformer
 - (iv) across arcing electrodes

- (f) The normal voltage used in dielectric heating is
- (i) 1.5 kV
 - (ii) 15 kV
 - (iii) 33 kV
 - (iv) 66 kV
- (g) Ni-Cr-Fe alloy wires can be safely used for temperature up to
- (i) 2500 °C
 - (ii) 2000 °C
 - (iii) 1150 °C
 - (iv) 850 °C
- (h) Which of the following methods is used to control temperature in resistance furnace?
- (i) Variation of resistance
 - (ii) Variation of voltage
 - (iii) Periodic switching on and off the supply
 - (iv) All of the above
- (i) For the welding of aluminium alloys which of the following methods would you recommend?
- (i) Acetylene-oxygen gas welding
 - (ii) d.c. arc welding
 - (iii) a.c. arc welding
 - (iv) tungsten arc welding

- The material of the heating element for a furnace should have
- (i) lower melting point
 - (ii) higher temperature coefficient
 - (iii) high specific resistance
 - (iv) All of the above
2. What is tractive effort of a train and what are its functions? Derive an expression for the tractive effort developed by a train.
3. An electric train weighing 400 tonnes runs along an upgradient of 1% with following speed time curve :
- (i) Uniform acceleration of 1.5 kmphps for 30 sec
 - (ii) Free-running for 36 sec
 - (iii) Coasting for 25 sec
 - (iv) Braking at 2.6 kmphps to rest
- If tractive resistance is 45 N/tonne, rotational inertia effect 10%, overall efficiency of transmission and motor 75%, determine the specific energy consumption.
4. With neat sketches describe the principle and construction of Ajax-Wyatt furnace.
5. A 3- ϕ arc furnace has to melt 10 tons of steel in 2 hours. Determine the average kW input to the furnace if its overall efficiency is 50%. If the current input is 9000 A with the above kW input and the resistance and reactance of the furnace are 0.003 Ω and 0.005 Ω respectively, determine the arc voltage and the total kVA taken from the supply. Assume latent heat of steel 0.12, latent heat of fusion of steel = 8.89 kcal/kg and melting point of steel = 1371 $^{\circ}\text{C}$.
6. Describe with neat sketch and diagram the laser beam welding process.
7. What do you understand by polar curves? Explain Rousseau's construction for calculating MSCP of a lamp.
8. Two 220 V lamps, one of 60 W and the other 75 W are connected in series across a 440 V supply. Calculate the PD across each lamp, neglecting any variation in resistance. Assuming the candle power to be proportional to the fourth power of the voltage, calculate the candle power of each lamp under this condition as a percentage of its value under normal operation at 220 V.