TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ELECTRICAL POWER ENGINEERING

EEP2307: HEATING,VENTILATION AND AC & REFRIGERATION

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: AUGUST 2019

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt **ANY THREE Questions**

Do not write on the question paper.

Question ONE

a) (i) Explain the procedure of calculating the cooling capacity required for a given room size to be fitted with an air conditioner
(ii) Calculate the amount of heat needed in kJ to increase the temperature of 5Kg of water from 15^0C to 50^0 C **(12marks)**

b) (i) Explain any THREE possible faults in refrigeration
(ii)Explain the disadvantages of gas detection avoided by the sensor principle used in the HLD 5000 detector **(8marks)**

Question TWO

(a) (i) Describe the process of induction heating and give TWO of its merits
(ii) A metallic conductor of a resistivity of 1.5x 10^{-5} Ωm and a relative permittivity of 5 is to be heated by induction at a frequency of 40MHz. Determine the:-
(I) Depth of penetration
(II) Frequency required if the depth of penetration is to be doubled **(12marks)**

(b) (i) With the aid of a diagram explain the principle of operation of dielectric heating
(ii) Describe any TWO areas of application of dielectric heating **(8marks)**

Question THREE

(a) Explain "ventilation " as applied to industry **(3marks)**

(b) Describe the following techniques and architectural features used to ventilate building and structures

(i) Natural ventilation

(ii) Demand-controlled ventilation

(iii) Local exhaust ventilation **(9marks)**

(c) Explain the following in relation to ventilation

(i) Ventilation efficiency

(ii) System imbalance

(iii) Cross contamination

(iv) Re-entry of exhaust air **(8marks)**

Question FOUR

(a) (i) With the aid of a basic refrigeration cycle diagram explain the principles of operation of refrigeration

(ii) Explain the following terms used in refrigeration and air-conditioning

I Ton of refrigeration

II Refrigeration effect **(10marks)**

(b) (i) Derive the TWO equations necessary for designing the length and diameter of a circular element used in resistance ovens

(ii) Calculate the length of nickel chrome wire required to make a circular element for a 16Kw, 240V single phase resistance oven. The temperature is not to exceed 900^0 C

Take e = 0.9, k = 0.6 ,Temperature of charge= 600^0C ,ρ for nickel chrome= 1.016 x 10^{-6} Ωm.

(10marks)

Question FIVE

a) State with reasons the most appropriate type of electric heating to be applied for each of the following:

(i) Surface hardening of metals

(ii) Curing of sand cores in foundries **(4marks)**

(b) Explain any TWO types of electric welding methods **(6marks)**

(c) (i)Describe the THREE temperature control techniques for resistance ovens

(ii) Explain any TWO desirable properties of resistance heating elements **(10marks)**