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**University Examinations 2015/2016**

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN

ELECTRICAL INSTALLATION

**EEE 1150: ELECTRICAL ENGINEERING PRINCIPLES II**

**DATE: AUGUST 2016 TIME: 1 ½ HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two***questions.

**QUESTION ONE (30 MARKS)**

1. Define the following terms
2. Magnetism (1 mark)
3. Magnetic domain (1 mark)
4. Ferromagnetic material (1 mark)
5. Magnetic moment (1 mark)
6. Magnetic field (1 mark)
7. Root mean square (rms) value (1 mark)
8. Differentiate between the following
9. Temporary and permanent magnets (2 marks)
10. Diamagnetic and paramagnetic materials (2 marks)
11. A magnetic pole face has a rectangular section having dimensions 200mm by 100mm. If the total flux emerging from the pole is 150µWb, calculate the flux density (3 marks)
12. Figure 1 below shows a coil of wire wound on an iron core connected to a battery. Sketch the magnetic field pattern associated with the current carrying coil and determine the polarity of the field. (3 marks)

Figure 1

1. An electromagnet, based on the solenoid, provides the basis of many items of electrical equipment. Name four examples (4 marks)
2. A conductor carries a current of 20A and is at right angles to a magnetic field having a flux density of 0.9T. If the length of the conductor in the field is 50cm,
3. Calculate the force acting on the conductor (3 marks)
4. Determine also the value of the force if the conductor is inclined at an angle of 300 to the direction of the field (3 marks)
5. Given a 240V main supply, determine the following
6. Peak value (2 marks)
7. Mean value (2 marks)

**QUESTION TWO (20 MARKS)**

1. What is the difference between “unidirectional” and “alternating” wave forms as applied in A.C generation (2 marks)
2. Using sketches, illustrate one example of
3. Unidirectional waveform. (3 marks)
4. Alternating waveform (3 marks)
5. Using the triangular wave form shown below, determine the following
6. Frequency (2 marks)
7. Average value over half cycle (2 marks)
8. Rms value (2 marks)
9. Form factor (1 mark)

**QUESTION THREE (15 MARKS)**

1. State Farady’s laws of electromagnetic induction (2 marks)
2. State Len’s law of electromagnetic induction (1 mark)
3. State Fleming’s right-Land rule (1 mark)
4. A conductor 300mm long moves at a uniform speed of 5m/s at right angles to a uniform magnetic field of flux density 2T. Determine the current flowing in the conductor when
5. Its ends are open circuited (1 mark)
6. Its ends are connected to load of 25Ω resistance (4 marks)
7. A conductor moves with a velocity of 20m/s at an angle of 600 to a magnetic field produced between two square-faced poles of side length 2.5cm. If the flux leaving a pole face is 6 µWb, determine the magnitude of the induced e.m.f (4 marks)
8. The wing span of a metal aeroplane is flying at 720km/h, determine the e.m.f induced between its wing tips. Assume the vertical component of the earth’s magnetic field is 50µT (4 marks)

**QUESTION FOUR (15 MARKS)**

1. State the functional difference between analogue and digital measuring instruments. (2 marks)
2. State three essential devices required in all analogue electrical indicating instruments and state their functions (3 marks)
3. State the difference between a shunt and a multiplier (2 marks)
4. A moving-coil instrument gives a f.s.d when the current is 40mA, and its resistance is 25Ω. Calculate the value of the shunt to be connected in parallel with the meter to enable it to be used as an ammeter for measuring currents up to 50A. (4 marks)
5. In a wheatstone bridge ABCD shown below, galvanometer is connected between A and C, and a battery between B and D. A resistor of unknown value is connected between A and B. When the bridge is in balance, the resistance between B and C is 100Ω, that between C and D is 10Ω and that between D and A is 400Ω. Calculate the value of the unknown resistance (4 marks)