COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IN ELECTRICAL SERVICEMAN'S COURSE

UNIT CODE: EEE221

TITLE: APPLIED ELECTRICITY 2

FINAL EXAMINATION – PENSTER 2, 2015

ROOM: AS PER TIMETABLE
TIME: 2 HOURS 10 MINUTES
TOTAL MARKS - 100

INSTRUCTIONS TO STUDENTS

1. You are allowed **10 minutes** extra **reading time** during which you are **NOT** to write.
2. Begin each SECTION on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. **ANSWER ALL QUESTIONS**
9. Show all working where necessary.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM.**

SECTION A

MULTIPLE CHOICE   **(20 MARKS)**

In each question there is only one right answer. Write the identifying letter of the correct answer in your booklet.

1. In a three phase STAR connection the line current is equal to:
   a. the phase current
   b. The phase current multiplied by √3
   c. the phase current multiplied by √2
   d. the phase current divided by √2

2. The phase voltage in DELTA connection is equal to
   a. the line voltage divided by √3
   b. the line voltage divided by √2
   c. the line voltage multiplied by √3
   d. the line voltage

3. The stationary part of an AC motor is
   a. the stator
   b. the squirrel cage
   c. the rotor
   d. the centrifugal switch

4. The direction of rotation of a split phase motor can be reversed by
   a. interchanging both the start and run winding
   b. interchange the start winding
   c. interchanging the supply lined
   d. interchanging the capacitor leads

5. The main purpose of connection a capacitor in the start winding of a capacitor start motor is:
   a. to give a starting torque
   b. to increase the power factor
   c. to increase the current value
   d. to decrease the power factor

6. A DC motor which contains both the series and shunt field windings is called the:
   a. shunt motor
   b. compound motor
   c. series motor
   d. shaded pole motor

7. The part of a DC series that allows the supply current to link rotating and stationary parts is the:
   a. field windings
   b. commutator
   c. bruses
   d. field poles

8. The method of reversing the direction of rotation of a capacitor start motor is by:
   a. interchanging the running winding
   b. interchanging the start winding and the run winding
   c. interchanging the supply lines
   d. removing the rotor, turn the stator around and put back the rotor

9. Capacitor start and capacitor run motors are suitable for:
   a. light loads
   b. heavy duty loads
   c. moderate loads
   d. no load

10. Which of the following single phase motors has its run winding and the capacitor in series permanently connected to the supply line
    a. capacitor start motor
    b. capacitor start capacitor run motor
    c. universal motor
    d. capacitor run motor

11. The side of the transformer where the supply is connected is called the:
    a. secondary
    b. primary
    c. output Voltage
    d. load Voltage

12. Which of the following is true about transformer ratios:
    a. the voltage is NOT proportional to the number of turns
    b. the voltage is proportional to the number of turns
    c. the turns is proportional to the current
    d. the voltage is proportional to the current

13. Since transformers are supplying equipments similar to the alternator , they are rated in :
    a. kW
    b. kVA
    c. kVAR
    d. Volts

14. A step down transformer causes the:
   a.   Primary current to exceed the secondary current
   b.   Primary power to exceed the secondary power
   c.   secondary power to exceed primary power
   d.   Secondary current to exceed primary current

15. Delta connection is suited for:
   a.   locally operated machinery
   b.   not locally operated machinery
   c.   long distance
   d.   large factories

16. The core type transformers are more suitable for:
   a.   high voltage
   b.   low voltage
   c.   both high and low voltages
   d.   All of the above

17. The material with which brushes are made:
   a.   carbon and oxygen
   b.   graphite and carbon
   c.   graphite and oxygen
   d.   carbon and graphite

18. In any motor
   a. mechanical energy is converted to electrical energy.
   b. electrical energy is converted to mechanical energy
   c. solar energy is converted to wind energy
   d. windings converted to energy

19. In a star connected three phase system there are:
   a. two values of voltages
   b. two values of current
   c. one voltage
   d. one current

20. The operation of a transformer is based on the principle of:
   a. induced voltage
   b. mutual induction
   c. step-up
   d. step-down

(1 mark for each correct answer)

SECTION B   (10 MARKS)

MATCHING.

1. Transformer rating	A. Carbon
2. Delta connected system	B. Silicon
3. Series motor	C. Rectifiers/inverters
4. Capacitor start motor	D. Main frame
5. Core/Shell type	E. $\sqrt{2}\, V_{ac}$
6. Brushes	F. Transformer core
7. Motor Component	G. Moderate torque
8. Diode	H. Low starting torque
9. Semiconductor	I. One voltage
10. PRV	J. KVA

SECTION C

QUESTION 1   (30 marks)

1.1   Show the internal connections of a three phase transformer connected in
       star/delta   (6 marks)

1.2   Draw the circuit connection and just write down the method of reversing the
       rotation of the following single phase motors:

       a.   Split - Phase motor   (8 marks)
       b.   Capacitor – Start motor   (8 marks)
       c.   Series motor   (8 marks)

QUESTION 2   **(20 marks)**

2.1   A transformer has 960 turns on its primary winding (N_p) and 48 turns on the
        secondary (N_s). Find the:
        a.   Turns ratio of the transformer   (4 marks)
        b.   Secondary voltage when 240V is applied to the primary (4 marks)

2.2   If the input for the bridge rectifier is 12V ac with 50Hz and the load resistance
        is 120Ω, calculate:
        a.   the load voltage   (2.5 marks)
        b.   the load current   (2.5 marks)
        c.   the ripple voltage   (2.5 marks)
        d.   the ripple frequency   (2.5 marks)
        e.   the peak reverse voltage.   (2 marks)

QUESTION 3   **(20 marks)**

3.1   List four advantage of the three phase system?   (4 marks)

3.2   State three types of transformer you know.   (3 marks)

3.3   Draw and label the connection diagram of the following DC machines:
        a.   Series motor   (4 marks)
        b.   shunt motor   (4 marks)

3.4   List down the names of five (5) parts /components of a dc machine.
                                                                       (5 marks)

THE END