

**B. Voc Automotive Mechatronics**  
**Subject: Electrical Machines and Control System**  
**Subject Code: ABEE-201**  
**Semester-3<sup>rd</sup>**  
**Theory (External): 35**  
**Time: 03 hours**

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**Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. **Section A** comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. **Section B** comprises 6 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

<b>Roll Number</b>					

**SECTION -A (OBJECTIVE TYPE QUESTIONS)**  
**(10x1=10 Marks)**

1. A synchronous machine can operate
  - a) only as generator
  - b) only as motor
  - c) Both a & b
  - d) None
  
2. 4 pole, 1200 rpm alternator will generate an emf at frequency
  - a) 60 Hz
  - b) 50 Hz
  - c) 40 Hz
  - d) 25 Hz
  
3. The synchronous speed of Induction motor can be increased by
  - a) reducing mechanical friction
  - b) increasing supply voltage
  - c) increasing number of poles
  - d) increasing frequency of supply
  
4. For an standstill induction motor, slip is
  - a) zero
  - b) 0.5
  - c) Infinity
  - d) 1
  
5. The yoke of DC machine is
  - a) always laminated
  - b) never
  - c) may or may not
  - d) none

6. By equating the denominator of transfer function to zero, which among the following will be obtained?
  - a) Poles
  - b) Zeros
  - c) Both
  - d) None of the above
  
7. How is an output represented in the control systems?
  - a)  $r(t)$
  - b)  $c(t)$
  - c)  $x(t)$
  - d)  $y(t)$
  
8. According to signal flow graph, which among the following represents the relationship between nodes by drawing a line between them?
  - a) Branch
  - b) Self-loop
  - c) Semi-node
  - d) Mesh
  
9. Which among the following measures the speed of D.C. motor?
  - a) Galvanometer
  - b) Gaussmeter
  - c) Potentiometer
  - d) Tachometer
  
10. Basically a potentiometer is a device for
  - a) Comparing two voltages
  - b) Measuring a current
  - c) Comparing two currents
  - d) Measuring a voltage

**SECTION -B (ESSAY TYPE QUESTIONS)**  
**(5x5=25 Marks)**

1. Derive the emf equation for DC generator.
2. State Mason's gain formulae and explain with it examples.
3. A 6 pole ac generator is running and producing voltages at frequency of 60 hz. Calculate the revolutions per minute of generator. If frequency of generated voltage is required to be decreased to 20 hz, how many poles would be needed on generator, if it still runs at the same speed.
4. Explain speed and torque characteristics of DC Shunt motor.
5. Explain closed and open loop system with examples.
6. Write a note on any two
  - a) Potentiometer
  - b) Synchro transmitter
  - c) Electronic PID Controller

-----End of Paper-----

**170102**

## **B. Voc Automotive Mechatronics**

**Subject: Digital and Power Electronics**

**Subject Code: ABEC-201**

**Semester-3<sup>rd</sup>**

**Theory (External): 35**

**Time: 03 hours**

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**SECTION -A (OBJECTIVE TYPE QUESTIONS)**  
**(10x1=10 Marks)**

- 1 The firing angle for firing circuit is
  - a)  $0 \leq \alpha \leq 90^\circ$
  - b)  $90 \leq \alpha \leq 180^\circ$
  - c)  $0^\circ \leq \alpha \leq 180^\circ$
  - d) None
  
- 2 The cycloconvertors are used to convert voltage from
  - a) Fixed AC to variable AC
  - b) Fixed AC to variable DC
  - c) Fixed DC to variable DC
  - d) Fixed DC to variable AC
  
- 3 Amplitude modulation is the ratio of
  - a) Amplitude of reference signal to amplitude of carrier signal
  - b) Amplitude of carrier signal to amplitude of reference signal
  - c) Both
  - d) None
  
- 4 In a 3 phase,  $180^\circ$  mode voltage source inverter, each thyristor conducts for
  - a)  $120^\circ$
  - b)  $180^\circ$
  - c)  $90^\circ$
  - d) All
  
- 5 The snubber circuits are used for
  - a) overcurrent protection
  - b)  $di/dt$  protection
  - c) overvoltage protection
  - d) none

- 6 The truth table for S-R flip flop has how many valid entries :
- a) 1
  - b) 2
  - c) 3
  - d) 4
- 7 The sequential circuit is also called as:
- a) flip-flop
  - b) latch
  - c) strobe
  - d) none
- 8 Decimal value of 1010 is
- a) 9
  - b) 10
  - c) 8
  - d) 12
- 9 All logic operations can be obtained by means of
- a) AND & NAND
  - b) OR & NOR
  - c) OR & NOT
  - d) AND & NOR
- 10 An OR gate has 4 inputs. One input is high and the other three are low. The output is .....
- a) Low
  - b) High
  - c) alternately high and low
  - d) may be high or low depending on relative magnitude of inputs

**SECTION -B (ESSAY TYPE QUESTIONS)**  
**(5x5=25 Marks)**

- 1 Implement the following multi o/p combinational logic circuit using 4 to 16-line decoder  
$$F1 = \sum m(2,3,9,11)$$
$$F2 = \sum m(10,12,13,14)$$
- 2 Design full adder circuit using two half adder circuit.
- 3 Write a short note on commutation techniques of SCR.
- 4 Explain switching characteristics of IGBT using appropriate diagram.
- 5 Explain and sketch the block diagram of JK flip flop.
- 6 Explain the working of  $1\phi$  to  $1\phi$  circuit step up cyclo converter.

-----END OF THE PAPER-----