Roll No.

Candidate should write his/her Roll No. here.

Total No. of Questions : **03** No. of Printed Pages : **04**

M-SFS-I-2017 (14)

ELECTRONICS ENGINEERING

(Optional Subject)

First Paper

Time : **3** Hours] [Total Marks : **200**

Instructions to the candidates :

1. This question paper consists of **three** questions and all questions are compulsory.

2. Marks for each question have been indicated on the right hand margin.

3. There is no internal choice in Question No. **1**, remaining questions carry internal choice.

4. The first question is of very short-answer type consisting of **15** compulsory questions. Each one is to be answered in one or two lines. Question No. **2** is short answer type, word limit is **100**. Question No. **3** is long answer/Essay type, word limit is **300**.

5. Wherever word limit has been given, it must be followed to.

6. Question should be answered exactly in the order same as mentioned in the question paper. Answer to the various parts of the same question should be written together compulsorily and no answer of the other question should be inserted between them.

1. Attempt all questions and answer in **one** or **two** lines : $15 \times 4 = 60$

(A) Define RMS value of a sinusoidal quantity.

(B) An electric circuit with 9 branches and 7 nodes will have how many loop equations ?

(C) Three parallel resistive branches are connected across a d.c. supply. What will be the ratio of the three branch currents if the branch resistances are in a ratio 2 : 4 : 6 ?

(D) A capacitor is charged through a potential difference of 200 volts and has a charge of 0.2 Coulomb. When it is discharged how much energy will be released ?

(E) Equivalent resistance of two parallel resistances is 0.7 Ohm. If one of the resistances is broken the equivalent resistance becomes 2 ohm. What is the resistance of the broken resistor ?

(F) State superposition theorem.

(G) Why is the efficiency of a Class B push pull amplifier much higher than that of Class A amplifier ?

(H) Can a transistor be realized by connecting two p-n junction diodes back to back ? Explain your answer.

(I) What is meant by bandwidth of an amplifier ?

(J) What is Barkhausen criterion for oscillators ?

(K) How does Hartley oscillator differ from Colpitt's oscillator in construction ?

(L) The drain gate capacitance of a junction FET is 2 pF. Assuming a common source voltage gain of 20, what is the input capacitance due to Miller effect ?

(M) What is the function of Zener diode in d.c. power supply ?

(N) Write the characteristics of an ideal Op-Amp.

(O) What is the effect of negative feedback on the bandwidth of an amplifier ?

2. Attempt any **ten** questions from the following questions. Answer to each question should be limited upto **100** words : **10 × 8 = 80**

(A) It is desired to have 2 micro Farad capacitance with applied voltage of 3000 volts using a number of 1 micro Farad capacitors. If the breakdown voltage of these capacitors is 500 volts, how many capacitors will be required ? Explain your answer.

(B) A series RLC circuit supplied by a 100 volt variable frequency source has a resistance of 50 Ohm, inductive reactance of 50 Ohms at 100 Hertz. Find the voltage across the capacitor at resonance if the resonance frequency is 500 Hz ?

(C) Explain the colour code used for carbon resistors.

(D) State maximum power transfer theorem for d.c. circuits and derive its condition.

(E) What is meant by bandwidth of an LC circuit ? What are half-power points ? Illustrate graphically also.

(F) The open loop voltage gain of an amplifier is 240 volts. The noise level in the output without feedback is 100 mV. If a negative feedback with $\beta = 1/60$ is used, what will be the noise level in the output ? Also derive its relevant equation.

(G) What is meant by intrinsic and extrinsic semi-conductors ? How are P-type and N-type semi-conductors obtained ?

(H) What are tunnel diodes ? What are their applications ? Draw their Volt-Ampere characteristics.

(I) What is an SCR ? What are the its applications ? Draw the static and dynamic characteristics of SCR.

(J) Compare the class A, class B and class C power amplifiers on the basis of their efficiency and field of application.

(K) Describe the operation of a solar cell.

(L) What is slew rate and CMRR of Op-Amp ? What is its significance ?

(M) What are the different kinds of series and shunt feedbacks provided in a feedback amplifier ? Explain each briefly.

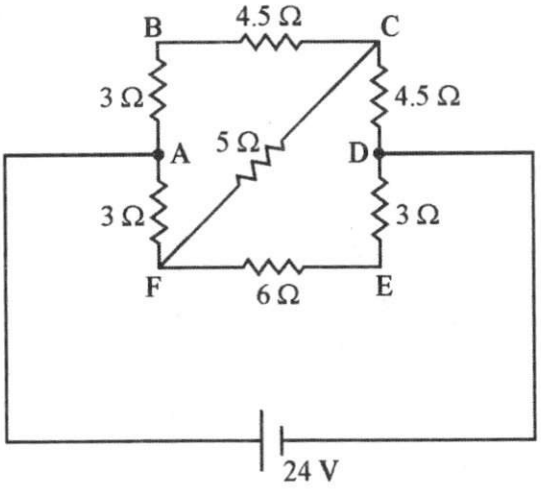
3. Attempt any **three** questions. Answer to each question should be limited upto **300** words : **3 × 20 = 60**

(A) Draw and explain the working of full wave diode bridge rectifier circuit. Draw the output voltage waveform and show conduction sequence of diodes. Find the expression for output d.c. voltage and current.

(B) Explain the operation of practical Op-Amp integrator and differentiator circuits. What are their applications ?

(C) With suitable diagram, explain the operation of Wien bridge oscillator. Find out the condition for a balanced bridge. List the advantages and applications.

(D) Calculate using Thevenin's theorem, the current through the branch FC.



(E) Explain the construction and characteristics of Depletion and Enhancement type MOSFET.
