TMG – 09

B.Sc. (Semester – V) Examination, April 2019
PHYSICS (Paper – I)
Electronics

Duration : 2 Hours | Total Marks : 80

Instructions : *1) **All** questions are **compulsory.***
*2) Figures to the **right** indicate **marks.***
*3) Symbols have their **usual** meaning unless **otherwise** stated.*
*4) Draw **neat** diagrams **wherever** necessary.*
*5) **Use** of calculator is **permitted**.*

1. Answer **any four** of the following : **16**

a) Draw the circuit diagram of an inverter using a transistor. State the use of the following circuits :
   i) Astable multivibrator.
   ii) Monostable multivibrator.

b) Define pinch off voltage, drain resistance, transconductance and amplification factor for a JFET.

c) Draw the circuit diagram of Op-amp square wave generator. Sketch the output and capacitor waveforms.

d) Name the universal gates used in the Sum of product and product of sum methods.

e) Design a 100 KHz, 60% duty cycle square wave generator using IC 555 timer.

f) With the help of a neat diagram and truth table, explain the working of a JK master-slave flip flop.

2. Answer **any four** of the following : **16**

a) What do the turn-on and turn-off times consist of in a switching transistor ? What does the period of oscillation of a symmetrical multivibrator depend upon ?

P.T.O.

b) I) What are the two main types of field-effect transistors ?

II) What is the main advantage of the FET over a conventional transistor ?

III) What do the terms "unipolar" and "bipolar" refer to ?

c) With the help of a neat circuit diagram, explain Op-amp as a differentiator.

d) Write the relation for the time period of an IC 555 timer astable multivibrator. Explain the need for obtaining the relation for the duty cycle D.

e) Draw the logic circuit diagram for a 3 input AND gate and explain its working.

f) What is meant by a modified count ? How many flip flops does a mod-42 counter require ?

3. A) Draw the circuit diagram for a JFET amplifier with common source and its Thevenin equivalent circuit at low frequencies. Write the expression for its voltage gain and input resistance. 6

OR

A) Explain the operation of JFET as voltage variable resistance. Describe the application of JFET as voltage variable resistance in voltage controlled attenuator. 6

B) Draw the circuit diagram of Schmitt trigger using transistors and explain its working. Write an expression for the LTP and UTP and hence the hysteresis. 6

4. A) Sketch the circuit of active peak detector using Op-amp and explain its working. 6

OR

A) With the help of circuit diagram and waveforms, explain the working of Op-amp Integrator. 6

B) Draw the circuit diagram of 555 timer connected as monostable multivibrator. Explain its working and sketch the relevant waveforms. 6

5. A) Using De Morgan's theorem, show that AND, OR and NOT gates can be realised using only NOR gates. Draw the necessary logic diagrams. **6**

OR

A) What is Half adder ? Construct the truth table for Half adder and show its implementation. **6**

B) Explain the principle of digital voltmeter. **6**

6. A) Explain the operation of mod-5 counter. **6**

OR

A) A three variable truth table has a low output for the following four input conditions : (100), (010), (101) and (110). Write the product of sum equation and draw the product of sum logic diagram. **6**

B) What is an encoder ? Draw the schematic diagram of decimal to BCD encoder and explain its working. **6**
