

D 52840

(Pages : 3)

Name.....

Reg. No.....

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)  
EXAMINATION, NOVEMBER 2023**

(CBCSS)

Physics

PHY IC 04—ELECTRONICS

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

**Section A***8 Short questions answerable within 7.5 minutes.**Answer **all** questions, each question carries weightage 1.*

1. Write a note on the frequency response of FET common source amplifier.
2. Explain quantum efficiency of an LED.
3. Draw the basic building blocks of an op-amp ?
4. List the main characteristics of an ideal Op-amp.
5. What is a flip-flop ? Give two uses.
6. Define (a) Common mode signal ; and (b) CMRR ?
7. What is Microprocessor ? List few applications of microprocessor-based system ?
8. Define slew rate.

(8 × 1 = 8 weightage)

**Section B***4 essay questions answerable within 30 minutes.**Answer any **two** questions, each question carries weightage 5.*

9. Explain the first order low and high pass filter using an op-amp and its frequency response.
10. Discuss the principle and working of a *p-n* junction solar cell. Deduce the expressions for short circuit and efficiency.

**Turn over**

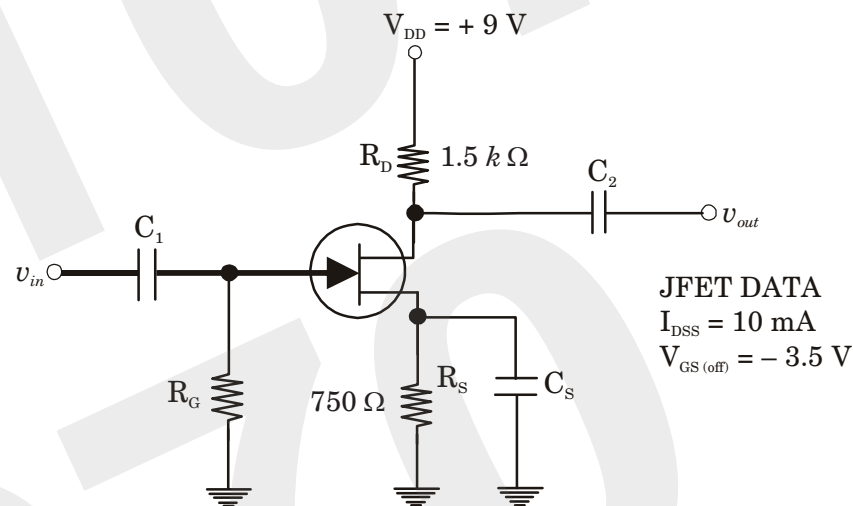
11. Draw op-amp as a Schmidt trigger circuit and explain how a square wave generator in this circuit. What is the advantage of Schmidt trigger over zero crossing detectors ?
12. With the help of a logic diagram explain the working of a 4 bit right shift register.  
(2 × 5 = 10 weightage)

### Section C

7 problems answerable within 15 minutes.

Answer any **four** questions, each question carries weightage 3.

13. The energy gap in a certain LED is 1.98 eV. Calculate the wavelength of the light given out. Are these radiations visible radiations ? Take  $h = 6.6 \times 10^{-34} \text{Js}$ .
14. How long will it take to shift an 8-bit number into a 54164 shift register if the clock is set at 10 MHz ?
15. Design a high pass filter at a cut off frequency 1 KHz ( $C = 0.01 \mu\text{F}$ ) with pass band gain 2 and plot the frequency response.
16. For the JFET amplifier circuit shown in Figure , calculate the voltage gain with (i)  $R_S$  bypassed by a capacitor ; and (ii)  $R_S$  unbypassed.



17. When  $V_{GS}$  of a JFET changes from  $-3.1$  V to  $-3$  V, the drain current changes from  $1$  mA to  $1.3$  mA. What is the value of transconductance ?
18. For an op-amp used as an inverting amplifier, determine the maximum output offset voltage  $V_{I_{io}}$ , caused by the input off set current  $I_{io}$ . Given  $R_F = 100$  k $\Omega$ ,  $R_1 = 1$  k $\Omega$ ,  $I_{io} = 200$   $\mu$ A.
19. Explain Ripple counter using logic diagram, truth table and waveform.

(4  $\times$  3 = 12 weightage)