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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)

ime : 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.

0. Discuss the principle and working of a *p-n* junction solar cell. Deduce the expressions for short circuit and efficiency.

Turn over

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11. Draw op-amp as a Schmidt trigger circuit and explain how a square wave generator i̶
    What is the advantage of Schmidt trigger over zero crossing detectors ?

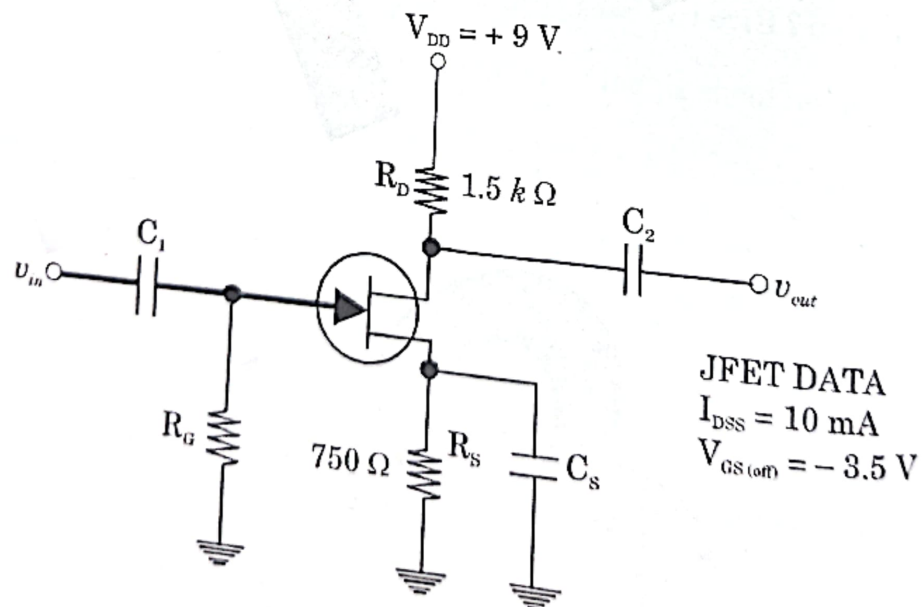12. With the help of a logic diagram explain the working of a 4 bit right shift register.

$(2 \times 5 = 1$

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 g̶
    these radiations visible radiations ? Take $h = 6.6 \times 10^{-34}$ Js.

14. How long will it take to shift an 8-bit number into a 54164 shift register if the c̶
    10 MHz ?

15. Design a high pass filter at a cut off frequency 1 KHz ($C = 0.01 \mu F$) with pass band g̶
    the frequency response.

16. For the JFET amplifier circuit shown in Figure , calculate the voltage gain with (i) R̶S̶
    a capacitor ; and (ii) RS unbypassed.

$V_{DD} = + 9$ V

R_D ⋛ $1.5\ k\Omega$

C_1

v_{in}

C_2

v_{out}

R_G

750 Ω ⋛ R_S

C_S

JFET DATA
$I_{DSS} = 10$ mA
$V_{GS(off)} = -3.5$ V

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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 VI_{io}, caused by the input off set current I_{io}. Given $R_F = 100$ kΩ, $R_1 = 1$ kΩ, $I_{io} = 200$ μA.

19. Explain Ripple counter using logic diagram, truth table and waveform.

$(4 \times 3 = 12$ weightage$)$