**D1APH2104** **(2 Pages)** **Name.....**
**Reg.No.....**

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**
**(Regular/Improvement/Supplementary)**

**PHYSICS**
**FPHY1C04- ELECTRONICS**

**Time: 3 Hours** **Maximum Weightage: 30**

**Part A: Short answer questions. Answer *all* questions. Each carries *one* weightage.**

1. Briefly explain the characteristics of an ideal opamp.
2. Why is the input terminal of the opamp where feedback resistor is connected often called virtual ground?
3. How digital switching is is done using MOSFET?
4. Obtain the expression for frequency in Wein bridge oscillator.
5. Explain the voltage divider bias circuit of JFET.
6. With the help of a circuit diagram, explain how opamp is used as a scale changer.
7. Briefly explain the working of a ring counter.
8. Differentiate between photodiode and solar cell.

**(8 × 1 = 8 weightage)**

**Part B: Essay questions. Answer any *two* questions. Each carries *five* weightage.**

9. Explain the working of a second order low pass and high pass butterworth filter with the help of circuit diagram. Hence obtain the circuit for band pass filter.
10. Differentiate between synchronous and asynchronous counter. Draw the logic circuit of asynchronous Mod-8 counter using JK FF and explain its counting action.
11. Why FET is called a voltage controlled device? Discuss V-I characteristics of JFET and explain how it is used as voltage variable resistor.
12. Discuss the working of an emitter coupled differential amplifier and hence obtain the expression for common mode and differential mode gain.

**(2 × 5 = 10 weightage)**

**(P.T.O.)**

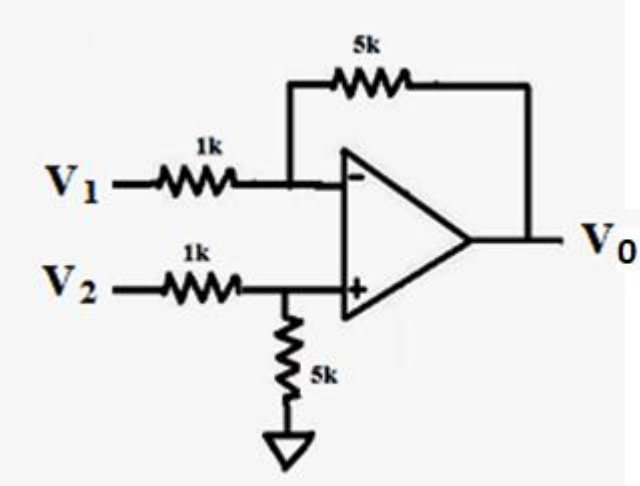
**Part C: Problems. Answer any *four* questions. Each carries *three* weightage.**

13. Keeping gate voltage constant, the drain to source voltage of a FET is changed from 20 to 10 V. The drain current then changes by 50 mA. Calculate drain resistance of the FET.

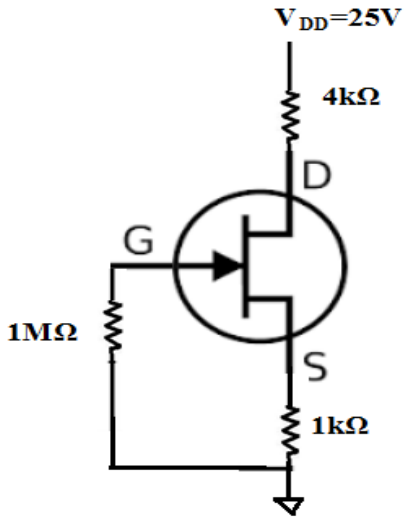
14. Explain the working of tunnel diode.

15. Using K-map, solve the SOP equation Y= Σm(4,6,7,9,10,11,13,15).

16. In the given circuit, the differential voltage is 5 mV sine wave at 1 kHz and common mode voltage 2 mV at 60 Hz. The opamp with CMRR 90dB is used. Calculate the amplitude of the induced 60Hz noise at the output.




17. If $I_{DSS}$=8mA, $V_P$= -8V. Determine the operating point

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18. If the required output of the opamp is 20 kHz sinusoidal signal with 10V peak voltage. Find the minimum acceptable slew rate of the opamp.

19. Design a differentiator amplifier circuit to differentiate signals upto 1 kHz .

**(4 × 3 = 12 weightage)**