Reg. No.....Name.....

M.SC. DEGREE END SEMESTER EXAMINATION NOVEMBER 2016

SEMESTER **– 1: PHYSICS**

COURSE: **16P1PHYT04 –: ELECTRONICS**

Time: Three Hours Max. Marks: 75

PART A (OBJECTIVE)

(Answer **all** questions. Each question carries 1 Mark)

1. An op-amp has an open-voltage gain of 200,000. If $v_{¿}=20\,mVdc \wedge \pm Vcc=15\,V$, what is the output voltage for the practical inverting amplifier?
   a) -4000V b) -14V c) +14V d) 28V
2. An op-amp with single break frequency, the gain-bandwidth product is
   a) constant b) Zero c) Infinity d) fluctuates
3. The peaking amplifier has $R_1=1\,k\Omega, L=100\,\mu H\ with\ 3\,\Omega\ internal\ resistance \wedge C=0.01\,\mu F$. Find the peak frequency?
   a)159kHz b) 220kHz c) 109kHz d) 175kHz
4. Slew rate of an op-amp is
   a) large signal phenomenon b) small signal phenomenon
   c) middle frequency phenomenon d) a dc phenomenon
5. The interval between the application of input step function and the time when output crosses the logic threshold voltage is called
   a) strobe release time b) response time c) slew rate d) saturation voltage

(1 x 5 = 5)

PART B (SHORT ANSWER)

(Answer **any seven** questions. Each question carries 2 marks)

6. Define the terms input bias and offset current?
7. Draw the ideal voltage transfer curve for the op-amp and explain its significance?
8. Describe the three open loop configurations of op-amp?
9. Write down the expression and working of scaling amplifier?
10. An op-amp can amplify both ac and dc. Substantiate this statement with proper explanation?
11. Give the working of a zero-crossing detector?
12. Explain the term CMRR and common mode configuration?
13. Write down the principle of Wien bridge oscillator?
14. With the help of circuit diagram, explain how an inverting amplifier can function as a current to voltage converter?
15. Explain the working of a sample and hold circuit? (2x 7 = 14)

PART C (PROBLEM/ SHORT ESSAY)

(Answer **any four** questions. Each question carries 5 Marks)

16. Determine the output voltage for the open loop differential amplifier using IC741, having A = 2,00,000, R_i = 2MΩ, R_o = 75Ω, V_{CC} = V_{CE} = ±15V.
    a) V_{in1} = 5μV_{DC} and V_{in2} = -7μV_{DC}
    b) V_{in1} = 10mV_{rms} and V_{in2} = 20mV_{rms}. Explain the results obtained?
17. In the inverting configuration, R_f = 2kΩ, R_1 = 1kΩ, R_a = R_b = R_c = 3kΩ, V_a = +1V, V_b = +2V, V_c = +3V and the supply voltage is ±15V. Determine the output voltage Vo for a) Summing amplifier and b) Averaging amplifier (choose proper value of R_f and R_1)
18. Design a compensating network for the 741IC. Vio =6mV, the supply voltage is ±15V
19. Construct a triangular wave generator for suitable amplitude and frequency.
20. Discuss the voltage to current converter circuit using op-amp with grounded load?
21. Design a second order low – pass filter at a high cut off frequency of 1kHz and pass band voltage gain of 1.586. Take the value of capacitance as 0.0047μF and feedback resistor R_F= 15.82kΩ. What changes will you make to get a new cut off frequency of 1.2kHz.

(5 x 4 = 20)

PART D (ESSAY)

(Answer **any three** questions. Each question carry 12 Marks)

22. Explain voltage shunt feedback amplifier. Obtain (i) negative feedback (ii) closed loop voltage gain (iii) input resistance with feedback (iv) output resistance with feedback and (v) bandwidth with feedback.
23. Derive the expressions for the gain, input resistance, output resistance and bandwidth of differential amplifiers constructed using one and two op-amps with feedback.
24. What do you mean by instrumentation amplifier? Explain the working of transducer bridge in an nstrumentation amplifier.
25. Explain the working of integrator and differentiator. Derive an expression for both of its output voltage with proper signals.
26. What is the Butterworth response? Explain with necessary theory, the working of second order low pass filter. Also, give the frequency response for first order and second order low pass filters?
27. Explain the working of Schmitt trigger, and draw the hysteresis curve for voltage? (12 x 3 = 36)

****