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PAR-003-1015027 Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

October / November - 2018

Physics : 503

(New Course)

Faculty Code : 003

Subject Code : 1015027

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Symbols have their usual meanings.
(3) Figures to the right indicate marks.

1 (a) Answer the following in short : **4**

(1) Write the formula for power gain in dB.

(2) Which coupling method is used to amplify extremely low frequencies ?

(3) Define distortion in an amplifier.

(4) Give the units of thermal resistance.

(b) Answer in brief : (any **one**) **2**

(1) A three stage amplifier has a first stage voltage gain of 50, second stage voltage gain of 100 and third stage voltage gain of 300. Find the total voltage gain in dB.

(2) A power transistor dissipates 4W. If the maximum junction temperature is 90°C, find the maximum ambient temperature at which it can be operated, given that θ=10°C/W.

(c) Answer in detail : (any **one**) **3**

(1) Give the comparison of different types of coupling methods.

(2) Define performance quantities of power amplifiers.

(d) Write notes on : (any **one**) **5**

(1) Explain R-C coupled amplifier with neat circuit diagram.

(2) Show that the maximum collector efficiency of transformer coupled class A amplifier is 50%.

2 (a) Answer the following in short : **4**

(1) Give the limitations of mechanical switch.

(2) Give the advantages of electronic switches.

(3) Define an integrating circuit.

(4) Define a clipping circuit.

(b) Answer in brief : (any **one**) **2**

(1) An astable multivibrator has $R_2 = R_3 = 12k\Omega$ and $C_1 = C_2 = 0.02\mu f$. Find the time period and frequency of the output wave form.

(2) A peak-to-peak input voltage of 20V is applied to a positive clipper. If $R_L = 1k\Omega$ and $R = 200\Omega$, determine the output voltage for each half cycle.

(c) Answer in detail : (any **one**) **3**

(1) Explain how a transistor works as a switch.

(2) Show that the output of a differentiating circuit is derivative of the input voltage.

(d) Write notes on : (any **one**) **5**

(1) Explain astable multivibrator with neat circuit diagram.

(2) What do you understand by a clamping circuit? Explain the working of a negative clamper with a neat circuit diagram.

3 (a) Answer the following in short : **4**

(1) What is the need of regulated power supply ?

(2) Write the equation of voltage regulation.

(3) Define differential amplifier.

(4) Give the classification of ICs based on structure.

(b) Answer in brief : (any **one**) **2**

(1) A power supply has a voltage regulation of 1%. If the no-load voltage is 30V, what is its full-load voltage?

(2) A non-inverting op-amp has $R_1 = 10k\Omega$ and $R_f = 1M\Omega$. Determine its voltage gain.

(c) Answer in detail : (any **one**) **3**

(1) Explain transistor series voltage regulator.

(2) Write the characteristics of an ideal op-amp.

(d) Write notes on : (any **one**) **5**

(1) Write a note on series feedback voltage regulator.

(2) Explain the use of op-amp as an adder.

4 (a) Answer the following in short : **4**

(1) Define transducers.

(2) Give two examples of nuclear transducers.

(3) Define tachometer.

(4) Write the equation which gives the relation between temperature and resistance of a metallic wire.

(b) Answer in brief : (any **one**) **2**

(1) A platinum wire with $R_0 = 100\Omega$ and $\alpha = 0.00385$, is kept in an environment at 100°C. What is its resistance?

(2) A wire strain gauge with a gauge factor K=5 is bonded to an iron member which is subjected to a strain of 10^{-7}. If the original no-strain resistance of the gauge is 100Ω, calculate the change in gauge resistance.

(c) Answer in detail : (any **one**) **3**

(1) Explain strain gauge.

(2) Explain resistive position transducer.

(d) Write notes on : (any **one**) **5**

(1) Explain construction and working of LVDT.

(2) Write a note on thermistor.

5 (a) Answer the following in short : **4**

(1) Write the difference between electrical and electronic instruments.

(2) Give the advantages of a digital voltmeter.

(3) Define flip-flop.

(4) Write the logic equations of SUM and CARRY for half-adder.

(b) Answer in brief : (any **one**) **2**

(1) If $R_A = R_B = 47k\Omega$ and C=1000 pF, calculate the frequency of oscillation of astable 555 timer.

(2) Calculate the output pulse width for the 555 timer of monostable multivibrator given that $R_A = 4.7k\Omega$ and $C = 1.5\ \mu f$.

(c) Answer in detail : (any **one**) **3**

(1) Write six applications of CRO.

(2) Write a note on demultiplexer.

(d) Write notes on : (any **one**) **5**

(1) Draw a block diagram of CRO and explain.

(2) Write a note on half-adder.
