



Sanjay Ghodawat University, Kolhapur
Established as State Private University under Govt. of Maharashtra. Act
No XL, 2017

2017-18
18ES2

F.Y.M. Sc.

School of Sciences

Department:
Physics
Semester – II

PHS 508

Electronics and Experimental Techniques

May 2018

End Semester Examination

Time: 3 Hr
Max Marks: 100

29 May 2018
11:30 AM to 1:30 PM

Instructions:

- 1) All Questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of Non-Programmable calculator is allowed.

Q.1 A) Select the correct alternative	Marks	All CO
i) In BJT, the common emitter current gain, β ranges from ----	[10]	508.1
a) 0 to infinity b) 0 to 1 c) 20 to 200 d) 2 to 20		
ii)-----device has the highest value of impedance.		508.1
a) BJT b) p-n junction c) JFET d) MOSFET		
iii) Luminescence in LED is also called as-----		508.1
a) Infection b) injection		
c) generation d) recombination		
iv) For an OP-AMP with negative feedback, the output is-----		508.2
a) equal to the input b) Increased c) feed back to the inverting input d) feed back to the non-inverting input		
v) Phase shifts through an OP-AMP is caused by-----		508.2
a) The internal RC circuit b) The external RC circuit		
c) The gain roll-off d) Negative feedback		
vi) A summing amplifier can have-----		508.2
a) Only one input b) Only two inputs		
c) Any number of inputs d) None of these		
vii) -----working on the principle of compression and expansion of the gas		508.3
a) Ion diffusion pump b) sputter ion pump		
c) Rotary pump d) None of these		
viii) The temperature of solid carbon dioxide employed as a cold trap in vacuum system is -----		508.3

	a) -78°C	b) -196°C	c) 77K	d) 90.18K	
	ix) In case of Joule-Kelvin expansion, if _____, the gas cools down and the temperature drops				508.4
	a) $b \ll a$	b) $a \ll b$	c) $a=b$	d) $a=b=0$	508.4
	x)----- remains constant in an isentropically process.				
	a) Enthalpy	b) Entropy			
	c) Helmholtz free energy	d) none of above			
Q.1	B)	Fill in the blank from given parenthesis:			[6]
	i)	In UJT, the p- type emitter is ----- doped.			508.1
	ii)	In integrating Op. Amp. output voltage waveform is ----			508.2
	iii)	----- vacuum pump is capable of producing a pressure of 10^{-3} T.			508.3
	iv)	The McLeod vacuum gauge indicates the system pressure on a ---- scale.			508.3
	v)	----- remains constant in an isenthalpic process.			508.4
	vi)	Pomerunchuk cooling is based on the principle of -----			508.4
Q.1	C)	State true and false for the following			[4]
	i)	In tunneling diode tunneling time across the device is very Short.			508.1
	ii)	In case of OP-AMP terminal two and three are used for offset null.			508.2
	iii)	Normally, McLeod gauge is used as calibration standard for low pressure measurement.			508.3
	iv)	In Case of Joule Kelvin expansion if $b \gg a$, the gas cools down and the temperature drops.			508.4
Q.2	Answer the following questions				
	a)	Define UJT. With the help of a neat diagram explain the construction, working, equivalent circuit and characteristics of a UJT.			[12] 508.1
	b)	Explain with I-V characteristics, construction and working of a solar cell.			[8] 508.1
	OR				
	b)	1. For silicon transistor with $\beta = 100$, $V_{cc} = 6\text{ V}$, $R_c = 3\text{ k}\Omega$, $R_b = 530\text{ k}\Omega$, Draw the d. c. load line and determine the operating point and stability factor.			[4] 508.1
		2. Obtain the relation between current amplification factor α and current amplification factor β for transistor configuration.			[4]
Q.3	Answer the following questions				
	a)	What is an Op. Amp.? With the help of neat circuit diagram explain inverting configuration of operational amplifier and obtain its expression for voltage gain.			[12] 508.2
	b)	Draw block diagram of IC555 timer and its pin configuration.			[8] 508.2
	OR				

- b) What is meant by active filter? Explain in detail first order low pass active filter. [8] 508.2

Q.4

Answer the following questions

- a) Describe the construction and working of a rotary pump for production of low pressure. [12] 508.3
- b) What are simple methods of leak detection? Explain palladium barrier for leak detection. [8] 508.3

OR

- b) Explain the construction and working of a diffusion ion pump. [8] 508.3

Q.5

Answer the following questions

- a) Considering Joule- Kelvin expansion as an isenthalpic process obtain the expressions for J-K coefficient and interpret them. Also obtain J-K coefficient in terms of Vander Waal coefficient. [12] 508.4
- b) Explain the method of cooling by adiabatic demagnetization. [8] 508.4

OR

- b) With necessary diagram explain principle of Pomeranchuk cooling. [8] 508.4

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