

**Sanjay Ghodawat University, Kolhapur**

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

2018-19

EXM/P/09/00

M.Sc. I

School of Science

Department of Physics

PHS 508

Electronics and Experimental
Techniques

Semester – II

Day & Date Monday
27-05-2019

End Semester Examination

(A)

Time: 30 Minutes Max Marks: 20
2.30 to 3.00 PM

Seat No.:	PRN No.:	Student Sign:
Invigilator Sign:	Examiner Sign:	Marks Obtained:

Instructions:

- 1) All Questions are compulsory.
- 2) Mark \checkmark to the correct option. Do not circle.
- 3) More than one options marked will not be considered for assessment.
- 4) Rough calculations on paper are not allowed
- 5) Use non-programmable calculator is allowed.

Q.1 Select correct alternatives

Marks

Bloom's
Level

CO

- | | | | | |
|----|--|----|--------------------|-------|
| 1. | In forward biased p-n junction diode, p-type is connected to _____ terminal and n-type is connected to _____ terminal. | 01 | L1 | 508.1 |
| a) | Positive, negative | b) | Negative, Positive | |
| 2. | If the p-n junction diode made up of silicon is forward biased with approximately _____ volts it starts allowing the electric current. | 01 | L1 | 508.1 |
| a) | 0.5 | b) | 0.6 | |
| c) | 0.7 | d) | 0.8 | |
| 3. | Typically, Beta (β) i.e. the current gain of the common emitter transistor configuration has a value between _____ for most general purpose transistors. | 01 | L1 | 508.1 |
| a) | 10 and 100 | b) | 20 and 200 | |
| c) | 30 and 300 | d) | 40 and 400 | |
| 4. | Schottky diode produces _____ reverse saturation current than the p-n junction diode. | 01 | L2 | 508.1 |
| a) | less | b) | large | |

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5. The closed loop gain of non-inverting Operational Amplifier will be given as, 01 L2 508.2
 a) $A = R_f/R_{in}$ b) $A = -R_f/R_{in}$
 c) $A = 1 + R_f/R_{in}$ d) $A = 1 - R_f/R_{in}$
6. One of the inputs of Op-amp is called the Inverting Input, which is marked with a_____. 01 L1 508.2
 a) negative sign b) positive sign
7. _____ is the gain of the op-amp without positive or negative feedback. 01 L1 508.2
 a) Open-loop gain b) Closed-loop gain
8. A first-order_____ attenuates low frequencies and passes all high frequency signals. 01 L2 508.2
 a) Active High Pass Filter b) Active Low Pass Filter
 c) Active Band Pass Filter
9. The assembly of rotary, diffusion and sputter ion vacuum pump can produce working pressure at the most of the order of _____Torr. 01 L1 508.3
 a) 10^{-9} b) 10^{-10}
 c) 10^{-11} d) 10^{-12}
10. Whetstone's bridge circuit is used in _____ gauge. 01 L1 508.3
 a) Mcleod b) Pirani
 c) Penning d) Thermocouple
11. Lowest measurement limit of Pirani gauge is_____ Torr. 01 L1 508.3
 a) 10^{-2} b) 10^{-3}
 c) 10^{-4} d) 10^{-5}
12. _____ is a simple leak detection method. 01 L1 508.3
 a) Soap film method b) Tesla coil method
 c) Discharge tube method d) All of the above

13. The single rotary vacuum pump can produce working pressure at the most of the order of _____ Torr. 01 L1 508.3
- a) 10^{-1} b) 10^{-2}
c) 10^{-3} d) 10^{-4}
14. Back streaming is the problem associated with _____ vacuum pump. 01 L2 508.3
- a) Rotary b) Diffusion
c) Sputter Ion d) All of the above
15. Joule-Kelvin coefficient in terms of van der waals constants 'a' and 'b' can be written as, 01 L2 508.4
- a) $\mu = \frac{1}{C_p} \left[\frac{2b}{RT} - a \right]$ b) $\mu = \frac{1}{C_p} \left[\frac{2a}{RT} - b \right]$
c) $\mu = \frac{1}{C_p} \left[\frac{2b}{RT} + a \right]$ d) $\mu = \frac{1}{C_p} \left[\frac{2a}{RT} + b \right]$
16. The experiment of adiabatic demagnetization of paramagnetic salt can be used continuously for cooling. 01 L2 508.4
- a) True b) False
17. The pure metal most commonly used for resistance thermometry is _____. 01 L1 508.4
- a) Gold b) Silver
c) Copper d) Platinum
18. If we cool a helium mixture (with x > 6.6%) to temperatures below _____, the liquid will eventually separate into two phases, one rich in ^4He and the other rich in ^3He . 01 L1 508.4
- a) 0.67 K b) 0.77 K
c) 0.87 K d) 0.97 K

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19. In dilution refrigerator the concentration of the dilute isotope, ^3He reaches a constant concentration of _____ ^3He in ^4He at saturated vapour pressure even for $T = 0\text{K}$. 01 L1 508.4
- a) 4.6% b) 5.6%
c) 6.6% d) 7.6%
20. With evaporation of ^3He liquid bath (^3He cryostat) we can reach up to a temperature minimum of _____. 01 L1 508.4
- a) 0.2 K b) 0.3 K
c) 0.4 K d) 0.5 K

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Semester – II

Day & Date Monday
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End Semester Examination

Time: 2 Hours 30 Minutes

Max Marks: 80

3.00 to 5.30 pm

(B)

- Instructions:**
- 1) All Questions are compulsory
 - 2) Rough calculations on paper are not allowed
 - 3) Use non-programmable calculator is allowed.

Q.2. Attempt the following

Marks Bloom's CO
Level

1. Write a detailed note on schottky diode. 12 L3 508.1
2. State the advantages and disadvantages of schottky diode. 4 L2 508.1

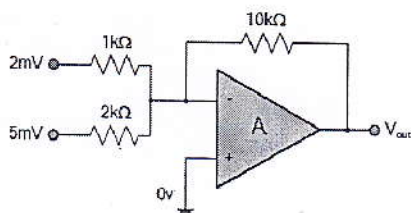
Or

2. Draw and explain V-I characteristics of UJT. 4 L2 508.1

Q.3. Attempt the following

Marks CO

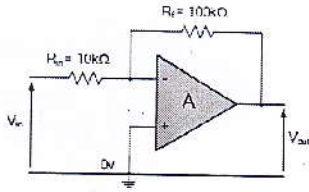
1. Elaborate the concept of Non-inverting Operational Amplifier configuration with negative feedback and also derive the expression of closed loop gain. 12 L3 508.2
2. Calculate the value of V_{out} for following amplifier circuit, 4 L3 508.2



Or

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2. Find the closed loop gain of the following inverting amplifier circuit. 4 L3 508.2



- Q.4. Attempt the following**
- | | Marks | | CO |
|---|-------|----|-------|
| 1. With the help of appropriate diagram discuss the working mechanism of Diffusion Vacuum Pump. | 12 | L2 | 508.3 |
| 2. Write a detail note on Palladium Barrier leak detector. | 8 | L2 | 508.3 |
| Or | | | |
| 2. Explain in detail the leak detection by gas probe method. | 8 | L2 | 508.3 |
| 3. State the advantages and disadvantages of Pirani gauge. | 4 | L2 | 508.3 |

- Q.5. Attempt the following**
- | | Marks | | CO |
|--|-------|----|-------|
| 1. Elaborate the idea of adiabatic demagnetization and explain the construction and working of cryostat where paramagnetic salt is used for cooling. | 12 | L4 | 508.4 |
| 2. Elaborate the idea of nuclear demagnetization with appropriate diagrams. | 8 | L3 | 508.4 |
| Or | | | |
| 2. Explain the construction and working of ^3He - ^4He dilution refrigerator with the help of appropriate diagrams. | 8 | L3 | 508.4 |
| 3. Write a short note on ^3He cryostat. | 4 | L2 | 508.4 |

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