



## M.Sc. II Semester Degree Examination, Sept./Oct. - 2024

### PHYSICS

#### Model Based Design of Physical Devices/Systems

#### (NEP)

Time : 1 Hour

Maximum Marks : 30

- Note :** (i) Answer **all** questions.  
(ii) Each question carries **one** mark.

1. What happens to the depletion layer of a p-n junction diode under forward bias ?  
(A) It widens (B) It narrows  
(C) Remains same (D) None
2. Which one of the following rectifiers uses four diodes ?  
(A) Half wave (B) Full-wave (C) Bridge (D) None
3. When the emitter is common to both i/p and o/p circuits, the configuration is called ?  
(A) CE (B) CB (C) CC (D) Open circuit
4. What is the main function of a transistor ?  
(A) Store data (B) Amplify signal  
(C) Generate light (D) Generate sound
5. Which part of a transistor controls the flow of current ?  
(A) Base (B) Emitter (C) Collector (D) Gate
6. Which configuration is known for inverting the input signal in an op-amp ?  
(A) Non-inverting (B) Inverting  
(C) Differential (D) Voltage follower
7. What is the typical output impedance of an ideal op-amp ?  
(A) Zero (B) Low (C) High (D) Infinity
8. Which type of feedback is used to stabilize the gain of an op-amp ?  
(A) -ve feedback (B) +ve feedback  
(C) Both (D) None



9. Which component is commonly used in clipping circuits ?  
(A) Resistor (B) Capacitor (C) Inductor (D) Diode
10. Which circuit shifts the entire signal voltage level up or down without changing its shape ?  
(A) Clipper (B) Clamper (C) Amplifier (D) Filter
11. What is the primary purpose of a virtual lab in electronics ?  
(A) Data storage (B) Remote access to equipment  
(C) Simulation of experiments (D) Communication between labs
12. Virtual labs can be particularly useful for experiments that are :  
(A) Easily accessible (B) High-risk  
(C) Time-consuming (D) Basic
13. Which aspect of virtual labs helps in promoting collaborative learning among students ?  
(A) Individual experimentation (B) Interactive simulations  
(C) Real-time data sharing (D) Cost efficiency
14. Which of the following is commonly simulated in an electronics virtual lab ?  
(A) Chemical reactions (B) Circuit behavior  
(C) Biological processes (D) Astronomical events
15. Which software tool is frequently used for simulating electronic circuits in virtual labs ?  
(A) Photoshop (B) SPICE  
(C) Microsoft Word (D) AutoCAD
16. During a virtual experiment, a 9V battery is connected across a  $3\Omega$  resistor and an unknown resistor R in series. If the total current is 1.5A, what is the value of R ?  
(A)  $1\Omega$  (B)  $2\Omega$  (C)  $3\Omega$  (D)  $4\Omega$
17. Which MathWorks product is specifically designed for modeling and simulating electronic systems ?  
(A) Simulink (B) Mathematica (C) Excel (D) LabVIEW
18. Which MATLAB function is used to perform Fourier Transforms ?  
(A) fft (B) fourier (C) dft (D) Transform
19. In MATLAB, what is the result of the command  $A=[1, 2; 3, 4]; \det(A)$  ?  
(A) 0 (B) 1 (C) -2 (D) 10



20. Using MATLAB, calculate the root mean square value of the vector [3, 4, 5] using the command `rms([3, 4, 5])`.  
(A) 3.08 (B) 4 (C) 4.08 (D) 5
21. Which function is used in MATLAB to create plots that can help visualize rotor balancing results ?  
(A) Plot (B) disp (C) fprintf (D) Save
22. What is the primary goal of single-plane balancing of a rigid rotor ?  
(A) Increase the speed (B) Reduce vibration  
(C) Improve lubrication (D) Enhance cooling
23. The Linux command is used to list all files and directories in the current directory is \_\_\_\_\_.  
(A) ls (B) pwd (C) cd (D) Rm
24. \_\_\_\_\_ is the library commonly used in Python for numerical computations.  
(A) NumPy (B) Matplotlib (C) Pandas (D) SciPy
25. Which Python function is used to install packages ?  
(A) Install (B) Get (C) Pip (D) Fetch
26. What does CRO stand for in electronics ?  
(A) Circuit Resonance Oscillator  
(B) Cathode Ray Oscilloscope  
(C) Capacitor Resistor Oscillator  
(D) Current Relay Oscillator
27. In ExpEyes, which sensor is used for detecting optical signals ?  
(A) Photodiode (B) Thermistor (C) LDR (D) Hall Sensor
28. The primary use of an acoustic sensor in electronics to measure \_\_\_\_\_.  
(A) Light (B) Sound (C) Pressure (D) Temperature
29. In thermal simulations, which property is crucial for determining heat transfer ?  
(A) Conductivity (B) Reflectivity (C) Elasticity (D) Viscosity
30. What type of radiation is detected using an Si based energy spectrometer ?  
(A) Gamma (B) Beta (C) Alpha (D) Neutron



