(Pages : 4) **U – 2747**

Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2024

Career Related First Degree Programme under CBCSS

Physics and Computer Applications

Core Course VII

PC 1541 : ELECTRONICS

(2014 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. Each carries **1** mark.

1. Distinguish between half-wave and full-wave rectifiers.
2. What is meant by a gain of an amplifier?
3. Explain the function of the emitter in the operation of a junction transistor.
4. What are push-pull amplifiers?
5. How does positive feedback differ from negative feedback?
6. Define the terms AM, FM, and PM.
7. Explain the advantages of negative feedback over positive feedback.
8. Discuss the schematic symbol and pin configuration of operational amplifiers.

P.T.O.

9. Express De Morgan's law.

10. What are flip-flops in digital electronic circuits?

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. Each carries **2** marks.

11. Explain how the process of Zener breakdown occurs in a P-N junction diode.

12. Discuss the relevance of CE configuration in amplifier circuits.

13. Discuss the operation of the class B amplifier.

14. Explain briefly multistage amplifiers.

15. What are feedback circuits and briefly explain the principle of sinusoidal feedback oscillations?

16. Write a short note on Barkhausen's criterion for oscillations.

17. Define modulation and demodulation.

18. Write a note on the frequency spectrum for FM.

19. Give the block diagram representation of the OP amp and also provide the characteristics of an ideal OP amp.

20. How does a differential mode differ from a common mode of OP amp?

21. What are the fundamental gates?

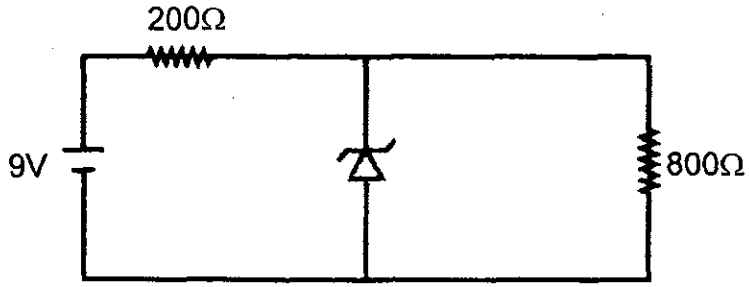
22. How can we differentiate D flip flop and T flip flop?

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each carries **4** marks.

23. Determine the current through zener diode for the circuit shown in figure (Given: zener diode break down voltage V_z = 4.8 V)



24. For a transistor, on changing the emitter current by 1.5 mA, its collector current is found to change by 1 mA. Find α and β.

25. A class A power amplifier has a transformer as the load. If the transformer has a turn ratio of 1 and the secondary load is 10 Ω, find the maximum a.c power output. Given that zero signal collector current is 1000 mA.

26. When a negative voltage feedback is applied to an amplifier of gain 10, the overall gain falls to 5? Calculate the fraction of output voltage feedback.

27. A sinusoidal carrier voltage of frequency 2 MHz and amplitude 200 volts is amplitude modulated by the sinusoidal voltage frequency 10 kHz producing 50% modulation. Calculate the frequency and amplitude of lower and upper side hand terms.

28. Draw the circuit diagram of summing amplifier and obtain the expression for output voltage.

29. Subtract 1010 from 1101.

30. Prove that $(A + C)(A' + B) = AB + A'C$.

31. How can we realize other gates using NAND and NOR?

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Each carries **15** marks.

32. Comment on SR Flip-flop.

33. Give a detailed account of the CE characteristic of BJT.

34. What are the different methods for the generation of FM signals? Explain any one method in detail.

35. Discuss on
    (a) Inverting and non-inverting amplifiers
    (b) Differential amplifier
    (c) Summing and subtracting amplifiers.

(2 × 15 = 30 Marks)

U – 2748

Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2024

Career Related First Degree Programme under CBCSS

Group 2(a) – Physics and Computer Applications

Core Course VIII

PC 1542 : ATOMIC AND NUCLEAR PHYSICS

(2013 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences; each question carries **1** mark.

1. What is space quantization?
2. Define J-J coupling.
3. Explain Larmor theorem.
4. What is Paschen-Back effect?
5. Explain isotope effect in rotational spectra.
6. What is an atomic nucleus?
7. Explain the term mass defect.
8. What is the cause of radioactivity?

9. What is the principle behind the atomic bomb?

10. How many types of elementary particles are in standard model?

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions, not exceeding a paragraph; each question carries **2** marks.

11. Explain the L-S coupling scheme.

12. With necessary diagram explain Vector atom model.

13. Explain Pauli's exclusion principle.

14. Explain stark effect.

15. What do you mean by space quantization?

16. What is rotational constant?

17. What are the merits and demerits of liquid drop model?

18. Give three properties of gamma rays.

19. What are the uses of nuclear reactors?

20. Explain Geiger-Nuttal law.

21. What is meant by mean life? Obtain an expression for it.

22. Explain quark model.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six**, each questions question carries **4** marks.

23. Calculate the wavelength separation between the unmodified line of wavelength 6000A° and the modified lines when a magnetic induction of 1 Wbm^{-2} is appeared in normal Zeeman effect.

24. What is the nuclear g_N factor for the 19F nucleus which has a magnetic moment of 2.673 μN? Nuclear spin quantum number I = 1/2.

25. In CO molecule, the number of differences between the successive absorption lines in the pure rotational spectrum is 384 m^{-1}. Calculate the moment of inertia of the molecule and the equilibrium bond length of the molecule. Mass of C^{12} and O^{16} atoms are 1.99×10^{-26} Kg and 2.66×10^{-26} Kg respectively.

26. OH radical has a moment of inertia of 1.48×10^{-47} Kgm^2. Calculate it's inter-nuclear distance. Also calculate its angular momentum and angular velocity for J = 5.

27. The CO molecule has a bond length of 0.113 nm and the mass of C^{12} and O^{16} atoms are 1.99×10^{-26} Kg and 2.66×10^{-26} Kg respectively. Find the energy of CO molecule, when it is in the lowest rotational state.

28. Calculate the binding energy of a ${}^{120}_{50}Sn$ nucleus. Given atomic mass of ${}^{120}Sn = 119.9022u$, mass of hydrogen atom = 1.00783 u, mass of neutron = 1.00865 u, $1u$ = 931.5 MeV.

29. The atomic ratio between the uranium isotopes ${}^{238}U$ and ${}^{234}U$ in a mineral sample is found to be 1.8×10^4. The half-life of ${}^{234}U$ is 2.5×10^5 years. Find the half-life of ${}^{238}U$.

30. Calculate the energy released by fission of 1 kg of U^{235} in KWH. The energy released per fission is 200 MeV and Avogadro number is 6.023×10^{23} mol^{-1}.

31. A reactor is developing energy at the rate of 32×10^6 W. How many atoms of U^{235} undergo fission per second? Assume that one an average energy of 200 MeV is released per fission.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions; Each question carries **15** marks.

32. With necessary diagram, explain Stern-Gerlach experiment. Explain its importance.

33. Briefly explain Zeeman effect on the basis of quantum mechanics.

34. Give the elementary theory of the origin of pure rotational spectrum of molecule. Mention its importance.

35. Explain the process of nuclear fusion, detailing the conditions required for fusion to occur. Discuss the process by which stars generate energy through nuclear fusion, with a focus on the role of hydrogen fusion.

(2 × 15 = 30 Marks)

(Pages : 3) **U – 2752**

Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2024

Career Related First Degree Programme under CBCSS

Physics and Computer Applications

Vocational Course

PC 1571 — DATABASE MANAGEMENT SYSTEM

(2021 Admission Onwards)

Time : 3 Hours Max. Marks : 80

PART – A (Very short answer type)

(One word to maximum of one sentence. Answer **all** questions).

1. DBMS is a software : State whether True/False.
2. There is only one ———— view for a database.
3. Primary key is the subset of ———— key.
4. Define multivalued attribute.
5. What do you mean by domain?
6. The concept of 2nd Normal Form in DBMS depends on ———— functional dependency.
7. Expand SQL.

P.T.O.

8. Define UNION keyword.

9. What do you mean by simple transaction?

10. Define Accountability in terms of database security.

(10 × 1 = 10 Marks)

PART – B (Short answer)

(Not to exceed one paragraph) Answer **any eight** questions. Each question carries **2** marks.

11. List any four applications of DBMS.

12. Write note on database language.

13. Define projection operation.

14. Define attribute.

15. What do you mean by redundancy?

16. Write a short note on 'update' query.

17. Define the term arity.

18. What do you mean by normalization?

19. Describe the term concurrency.

20. Write the need of multiple granularity.

21. List operating system issues related with security.

22. Explain data independence.

(8 × 2 = 16 Marks)

PART – C (Short Essay)

(Not to exceed **120** words, answer **any six** questions. Each question carries **4** marks.)

23. Explain in detail about domain relational calculus.

24. Write a note on mapping cardinalities.

25. Describe types of attributes in detail.

26. Write a detailed note on 1NF and 2NF with example.

27. Discuss in detail about nested subqueries.

28. Write a detailed note on outer join.

29. Describe ACID properties.

30. Explain validation based protocol in detail.

31. Write a detailed note on SELECT query.

(6 × 4 = 24 Marks)

PART – D (Long Essay)

(Answer **any two** questions. Each question carries **15** marks.)

32. Discuss on various data models in detail.

33. Write a note on ER diagram with example.

34. What are the set operations in SQL? Explain in detail.

35. Describe Physical and Logical security of a database in detail.

(2 × 15 = 30 Marks)
