

(Pages : 4)

N – 1626

Reg. No. :

Name :

27/4/2022

Sixth Semester B.Sc. Degree Examination, April 2022
Career Related First Degree Programme under CBCSS
Group2(a) – PHYSICS AND COMPUTER APPLICATIONS
PC 1671 – COMPUTER NETWORKS AND SECURITY
(2018 & 2019 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. Each question carries 1 mark.

1. What is networking?
2. What do you mean by bit rate?
3. Who invented PGP protocol?
4. DNS stands for?
5. What is public key cryptography?
6. Expand FTP.
7. CSMA stands for?
8. What is router?
9. What is a packet?
10. What is a plane text?

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any eight questions. Each question carries 2 marks.

11. What is gateway?
12. List the type of data flows.
13. What are datagrams?
14. What is the difference between hub and switch?
15. Given the bit rate, how can we calculate baud rate?
16. What is the use of file transfer protocol?
17. What is message digest?
18. List any four advantages of fibre optics.
19. What is the role of application layer?
20. What is a block cipher?
21. What is Ethernet?
22. What do you mean by pipelining?
23. What is the use of DES?
24. What is firewall?
25. What is a virus?
26. Why do we use encryption?

(8 × 2 = 16 Marks)

SECTION – C

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

27. What are the three types of switching in networks? Explain.
28. Explain various interfacing devices.
29. Why network security is important?
30. Differentiate TCP and UDP.
31. Write a note on cyclic redundancy check.
32. Explain briefly about IP security.
33. How radio transmission is done?
34. Write a note on digital signatures.
35. Explain CSMA/CD.
36. What is symmetric key cryptography? Explain with examples.
37. Write a note on leaky bucket algorithm.
38. What are the applications of S/MIME?

(6 × 4 = 24 Marks)

SECTION – D

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

39. Explain in detail the OSI model.
40. Discuss in detail, private key cryptography. Illustrate with examples.
41. Write a paragraph on distance vector routing.

42. What is the use of RSA algorithm?
43. What is the relevance of information security?
44. Discuss about Multiple Access Protocols.

(2 × 15 = 30 Marks)

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2022
Career Related First Degree Programme under CBCSS

Group 2(a) – Physics and Computer Applications

Core Course

PC 1672 : OPERATING SYSTEM

(2018 & 2019 Admission)

Time : 3 Hours

Max. Marks : 80

PART – A (Very Short Answer Questions)

Answer all questions. Each question carries 1 mark.

1. What is a process?
2. What you mean by sequential access in a file?
3. What is a system call?
4. What do you mean by preemptive scheduling?
5. Write need for process synchronization.
6. What do you mean by operating system interfaces?
7. What is a critical section?
8. What is the use of Operating System?

9. Expand the term PCB.
10. Write about free space management.

(10 × 1 = 10 Marks)

PART – B (Brief Answer Questions)

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

11. Explain any one type of Operating system.
12. Write note on Critical section problem.
13. Explain process synchronisation.
14. Write notes on swapping technique used in memory management.
15. What do you mean by deadlock avoidance?
16. Write notes on any one memory management technique.
17. Write notes on various security threats.
18. What is the use of a disk scheduling?
19. What is dining philosopher's problem?
20. Mention two preemptive scheduling mechanism.
21. Mention two operations that can be performed on process?
22. What do you mean by kernel I/O subsystem?
23. Explain physical address space.
24. What is a RAG?
25. Differentiate between fork() and clone() system calls.
26. Write note on access matrix.

(8 × 2 = 16 Marks)

PART – C (Short Essay Type Questions)

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

27. Short note on real time OS.
28. Explain bounded buffer problem.
29. Explain disk structure.
30. Explain the concept of paging.
31. Explain about memory mapping mechanisms
32. Explain any one deadlock avoidance algorithm.
33. Short note on multi threading.
34. Explain various principles of OS protection.
35. Write note on operating system functions.
36. *Short note on fragmentation.*
37. Short note on address binding.
38. Short note on inter process communication.

(6 × 4 = 24 Marks)

PART – D (Long Essay)

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

39. Explain various protection and security mechanism.
40. Explain critical section problems

41. Explain the concept of virtual memory.
42. Explain non contiguous memory allocations.
43. Explain various file management mechanisms.
44. Explain the concept of thread and multithreading.

(2 × 15 = 30 Marks)

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2022
Career Related First Degree Programme under CBCSS

Physics with Computer Applications

PC 1661.1 : ASTRONOMY AND ASTROPHYSICS

(2018 & 2019 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. What is Astrophysics?
2. Discuss "superforce" during the earliest Gamowian.
3. The temperature at which energy transforms into mass, and vice versa, is?
4. Which is the home galaxy to our solar system?
5. Name the process by which energy is produced in stars.
6. What are dark matters?
7. The critical black hole radius is called as _____
8. What is the speed with which, the Earth rotate in its axis?
9. A perfect emitter is called as _____
10. Define light year.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer **any eight** questions of **2** marks each.

11. What happen to mass of a particle, when temperature increases? Why?
12. According to the inflation theory, what is visible universe?
13. What are *microwave* background radiations?
14. How does the mass of a star is related to its life-style?
15. What are neutron stars?
16. How energy is produced in Sun?
17. Give Planck radiancy law and explain terms
18. Write a note on black body emitter.
19. What are solar flares and solar wind?
20. What are the characteristics of main sequence stars?
21. Explain RR Lyrae variables.
22. Explain triple-alpha process
23. Discuss Chandrasekhar limit.
24. What do you mean by invariable plane?
25. What are the types of meteorites?
26. What is the basis for the calendars?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions, not exceeding a paragraph. Each question carries 4 marks.

27. Outline the H-R diagram.
28. What are the limitations of standard model? How the inflation theory does explained these phenomenon?
29. Briefly discuss different layers of Sun.
30. In a Star, 13.6 eV of energy is required to ionize hydrogen from ground state.
 - (a) What will be the temperature inside the star?
 - (b) Find out the possible wavelength and nature of the emitted radiation?
31. Explain the classification of stars based on their spectral types.
32. State and explain Stefan-Boltzmann law. How it is related to the luminosity?
33. Explain
 - (a) White dwarf
 - (b) Brown dwarf
 - (c) Dark dwarf
34. What are galaxies? Discuss the types of galaxies.
35. Discuss Kepler's laws of planetary motion.
36. Give a note on
 - (a) Moon

OR

- (b) Jupiter
37. Give a detailed note on Asteroids.
38. Discuss the celestial coordinate system.

(6 × 4 = 24 Marks)

SECTION – D

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

39. (a) Give a note on the scope and importance of Astronomy.
(b) Brief the methods of Astrophysics.
40. Write a brief note on the birth and evolution of the universe.
41. Briefly explain stellar evolution.
42. Give a note on the following :
- (a) The Sun
 - (b) Comets
 - (c) Black holes
43. What are planets? Explain the formation of planets.
44. (a) Give a note on the evolution of calendar.
(b) "The inclination of the Earth cause seasons." Comment on the statement.

(2 × 15 = 30 Marks)

Reg. No. :

Name :

Sixth Semester B.Sc. Degree Examination, April 2022
Career Related First Degree Programme under CBCSS

Physics with Computer Applications

Core Course

PC 1642 – STATISTICAL MECHANICS AND QUANTUM MECHANICS

(2018 & 2019 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer should not exceed **two** sentences; **each** question carries 1 mark.

1. Define microstate in statistical mechanics.
2. Define entropy.
3. Write two examples of Fermions.
4. How many particles can be accommodated in a single energy state of bosons?
5. Write the equation for energy of a photon, with explanation of notations.
6. Define de Broglie hypothesis.
7. What are the uncertainty products?
8. Define the zero point energy of a harmonic oscillator.

P.T.O.

9. Write the time dependent Schrodinger equation of a particle in one dimension.
10. Prove that the probability $\psi^* \psi$ in quantum mechanics is real and positive.

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions in a paragraph. **Each** question carries **2** marks.

11. Define momentum space in statistical mechanics.
12. Explain phase space.
13. Explain bosons with example.
14. Distinguish between bosons and Fermions based on their wave functions.
15. Explain Bose Einstein condensation.
16. Write the postulates of free electron model.
17. Explain Rutherford's planetary model of atom and its drawbacks.
18. Explain how work function of a metal changes the kinetic energy of photo electrons.
19. Explain the postulates of Bohr atom model.
20. What is black body?
21. Explain the properties of a wave function.
22. Explain box normalisation.
23. How the quantum mechanical probability is related the wave function?
24. Explain stationary states.

25. Write and explain the uncertainty principle.
26. Explain Delta function potential.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions in a sentence or two, **each** question carries **4** marks.

27. Distinguish between canonical and grand Canonical ensembles.
28. A coin is tossed 8 times. Calculate the probability to get 6 heads and 2 tails.
29. Distinguish between a microstate and a macrostate.
30. Given that Boltzmann constant is $1.38 \times 10^{-23} \text{ JK}^{-1}$ and Avogadro number is 6.6×10^{23} . Calculate the value of root mean square speed of molecules of Oxygen molecule at 300K. Oxygen has an atomic weight of 16 u.
31. Calculate the Fermi velocity of an electron if its Fermi energy is 3.2 eV, mass of an electron is $9.1 \times 10^{-31} \text{ kg}$.
32. Calculate the wavelength of a photon to just emit an electron from a metallic surface of work function 2.6 eV. Given that Planck's constant is $6.602 \times 10^{-34} \text{ Js}$ and charge on an electron is $1.6 \times 10^{-19} \text{ C}$.
33. Compare the de Broglie wavelengths of an electron and a proton when they are moving at a speed of 10000 m/s in vacuum. Mass of electron is $9.1 \times 10^{-31} \text{ kg}$ and mass of a proton is $1.66 \times 10^{-27} \text{ kg}$.
34. Calculate the wavelength of light emitted due to the transition from $n=4$ state to $n=2$ state in a hydrogen atom. Given that the ionization potential of hydrogen atom is -13.6 eV.
35. The average life time of an excited atomic state is 10^{-10} s . The spectral line associated with the decay of the state is 500nm. Estimate the uncertainty in measuring the wavelength of the width of the line. Planck's constant is $6.602 \times 10^{-34} \text{ Js}$.

36. The uncertainty of the velocity of particle is equal to half of its actual velocity. If $\Delta p \Delta x = h$, show that the uncertainty in its position is its de Broglie wavelength. Given that the mass of the particle is constant and no relativistic variation of mass is assumed.
37. Normalize the wave function $\psi(x) = A \exp(-ax^2)$ where a and A are constants over the domain $-\infty \leq x \leq \infty$. Given that $\int_{-\infty}^{+\infty} \exp(-2ax^2) dx = \sqrt{\pi/2a}$.
38. Find the expression for probability of a particle trapped in a box of width L . The particle can be found between $x_1 = 0.45L$ and $x_2 = 0.55L$.

(6 × 4 = 24 Marks)

SECTION - D

Answer any **two** questions, each question carries **15** marks.

39. Write a note on the Maxwell Boltzmann distribution and velocity distribution of ideal gas molecules. Write the expressions for average speed, most probable speed and root mean square speed. Compare these velocities of a H_2 molecule.
40. What is quantum statistics? Derive Bose - Einstein statistical distribution.
41. What is ultraviolet catastrophe of the theory of a blackbody and how it was resolved by Planck's theory?
42. Prove that in Compton scattering, the change in wavelength is independent of the energy of radiation collide with the electron. Write the expression for Compton wavelength.
43. Explain the particle in a box problem in quantum mechanics.
44. Discuss the theory of quantum mechanical oscillator. Find its energy eigen value and zero point energy.

(2 × 15 = 30 Marks)