Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree Examination, April 2018
Career Related First Degree Programme under CBCSS
Physics with Computer Applications
Core Course – IX
PC 1641 – SOLID STATE PHYSICS
(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions.

(10×1=10 Marks)

1. Name the seven crystal systems.

2. State Bragg's law.

3. Define unit cell and primitive cell.

4. What is dielectric constant ?

5. What is meant by superconductivity ?

6. Mention the important applications of Hall effect.

7. Define polarizability.

8. What are fermi surface ?

9. State Widemann Franz law.

10. Define the magnetic susceptibility.

SECTION – B

Answer any 8 questions.

(8×2=16 Marks)

11. State Bloch theorem. What is the outcome of the theory ?

12. Explain Type I and Type II superconductors.

13. What are Miller indices ? Write the procedure for finding Miller indices of a given plane.

14. Compare ionic and covalent bond.

15. Explain Meissner effect.

16. What is dipolar polarizability ? How does it depend on the temperature of the dielectric ?

17. Explain the concept of free electron gas.

18. How are materials classified as dia or para or ferro-magnetic ?.

19. Describe NaCl structure.

20. What are amorphous solids and liquids ?

21. What is the advantage of neutron diffraction over electron diffraction ?

22. Give the reason for the failure of the free electron model.

SECTION – C

Answer **any six** questions.   **(6×4=24 Marks)**

23. A beam of X-rays is incident on a NaCl crystal with lattice spacing 0.282 nm. Calculate the wavelength of X-rays if the first order Bragg reflection takes place at a glancing angle of 8°35′.

24. A solid elemental dielectric with density 3×10^{28} atoms/m^3 shows an electronic polarizability of 10^{-40} farad m^2. Assuming the internal electric field to be a Lorentz field, calculate the dielectric constant of the material.

25. In a crystal, lattice plane cuts intercepts of 2a, 3b and 6c along the three axes where a, b, c are primitive vectors of the unit cell. Determine the Miller indices of the given plane.

26. Prove that the direct lattice is the reciprocal of its own reciprocal lattice.

27. Find the relaxation time and free path of conduction electrons in copper.

    Given : For copper density of free electrons n = 8.5×10^{28} /m^3, Resistivity ρ = 1.69×10^{-8} Ωm and average velocity of electrons = 1.154×10^5 m/sec.

28. A current of 50 A is established in a slab of copper 0.5 cm thick and 2 cm wide. The slab is placed in a magnetic field B = 1.5 T. The magnetic field is perpendicular to the plan of the slab and to the current. The free electron concentration in copper is 8.48×10^{28} electron/m^3. What is the magnitude of hall voltage across the width of the slab ?

29. Helium gas contains 2.7×10^{25} atoms/m^3 and dielectric constant of He atom if NTD is 1.0000684. Calculate the electronic polarizability of He-atoms.

30. A uniform copper wire of length 0.5 m and diameter 0.3 mm has a resistance of 0.12 Ω at 293 k. If the thermal conductivity of the specimen at the same temperature is 390 wm^{-1}k^{-1}. Calculate Lorentz number. Compare this value with theoretical value.

31. The distance between consecutive (III) planes in a cubic crystal is 2 Å. Determine the lattice parameter.

SECTION – D

Answer **any two** questions. **(2×15=30 Marks)**

32. What are the three main experimental X-ray diffraction method for analysis of crystal structure ? Explain any two methods in detail.

33. Describe Langevin's theory of paramagnetism classically and quantum theory.

34. Derive an expression for the specific heat of solids on the basis of Debye's model.

35. What is Josephson effect ? Discuss both D.C. and A.C. Josephson effects. Give its applications.

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Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree Examination, April 2018
Career Related First Degree Programme under CBCSS
Physics with Computer Applications
Core Course
PC 1642 : STATISTICAL MECHANICS AND QUANTUM MECHANICS
(2015 Admission)

Time : 3 Hours   Max. Marks : 80

SECTION – A

Answer **all** questions.   **(10×1=10 Marks)**

1. Define ensemble.

2. What is Bose-Einstein condensation ?

3. What is black body radiation ?

4. State Heisenberg uncertainty principle.

5. What is the effect of frequency of the incident radiation on emission of photoelectrons ?

6. Write the Schrodinger time dependent equation.

7. What is wave function ?

8. What are de Broglie waves ?

9. What you mean by phase space ?

10. Define Microstates.

SECTION – B

Answer **any 8** questions.   **(8×2=16 Marks)**

11. State the postulate of equal a Priori Probability.

12. How will you divide phase space into cell ?

13. Explain the concept of Thermodynamic probability.

14. Distinguish between Maxwell's Boltzmann and Fermi-Dirac statistics.

15. Why Rutherford's model could not explain the stability of atom ?

16. State the limitations of Bohr theory.

17. Give the properties of wave function (ψ).

18. Explain the affect of retarding potential difference on the photoelectric current.

19. Obtain the relation between entropy and probability.

20. Explain Grand-Canonical ensemble.

21. State the postulates of Bohr theory of hydrogen atom.

22. Give the application of BE and FD statistics.

SECTION – C

Answer **any six** questions.   **(6×4=24 Marks)**

23. Three distinguishable particles have a total energy of nine units, but the particles are restricted to energy levels 0 to 4. Calculate the number of macro-states and micro-states.

24. Prove that in the Photo-electric effect from a metal surface, the maximum velocity of the photo-electrons is related to the stopping potential by the equation $V_{max} = 5.927 \times 10^5 \sqrt{V_0}$, where V_{max} is in m/sec and V_0 is in volts.

25. The life time of an excited state of an atom is about 10^{-8} sec. Calculate the minimum uncertainty in the determination of the energy of the excited state.

26. A particle is moving in a one dimensional box (of infinite height) of width 10Å. Calculate the probability of finding the particle within an interval of 1Å at the centre of the box, when it is in its state·of least energy.

27. A hydrogen atom is 5.3×10^{-11}m in radius. Using the uncertainty principle, estimate the minimum energy an electron can have in this atom.

28. Find the wavelength of the H_α line of Balmer series of hydrogen atom, given energy of n = 2 orbit is –3.4 eV and energy of n = 3 orbit is –1.5 eV.

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E – 1892

Sixth Semester B.Sc. Degree Examination, April 2018
Career Related FDP Under CBCSS
Group 2(b) – Computer Science/Group 2(a) – Computer Applications
Core Course – CS 1641/Vocational Course xi – PC 1671
INTRODUCTION TO INFORMATION SECURITY
(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A
(Very Short Answer Type)

One word to maximum of **one** sentences. Answer **all** questions.   **(10×1=10 Marks)**

1. Define authentication.

2. Define encryption.

3. Expand RSA.

4. Define digital signature.

5. Expand MIME.

6. What is PGP ?

7. Define virus.

8. What is firewall ?

9. Define steganography.

10. What is a worm ?

SECTION – B
(Short Answer)

Not to exceed one paragraph, answer any eight questions. Each question carries two marks. **(8×2=16 Marks)**

11. Write a note on network security.

12. What is symmetric encryption ?

13. What is a cipher text ?

14. What is confidentiality ?

15. Write about message digest.

16. Differentiate IPv4 and IPv6.

17. Explain about ESP protocol.

18. Explain about SSL.

19. Define trojans.

20. What is a gateway ?

21. What is trusted systems ?

22. Write a note on Information Technology Act, 2008.

SECTION – C
(Short Essay)

Not to exceed 120 words, answer any six questions. Each question carries four marks. **(6×4=24 Marks)**

23. Explain in detail about authentication.

24. Write in detail about ciphers.

25. Write a note on data encryption.

26. Explain about ESP protocol.

27. Write a note on application level gateways.

28. Explain about malicious software.

29. Explain about virus.

30. Write a short note on Indian penal code.

31. Write a note on IT Act 2000.

SECTION – D
(Long Essay)

Answer **any two** questions. **Each** question carries **15** marks.   **(2×15=30 Marks)**

32. Explain in detail about digital signature algorithm.

33. Write a detailed note on system security.

34. Discuss role of firewall in security in detail.

35. Discuss in detailed :

   a) Cyber crime and IT Act 2000/2008.

   b) Indian Copyright Act.

   c) Consumer Protection Act.

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Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree Examination, April 2018
(Career Related First Degree Programme under CBCSS)
PHYSICS WITH COMPUTER APPLICATIONS
Elective Course
PC 1661.1 : Astronomy and Astrophysics
(2013 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. What is meant by equinox ?

2. Explain Celestial sphere.

3. What is solar eclipse ?

4. What is a leap year ?

5. What is a supernova ?

6. Name the different spectral classes of stars according to their temperatures.

7. What is the asteroid belt ?

8. Write down the names of any four constellations.

9. Define the astronomical unit of distance.

10. What are solar prominences ?   **(10×1=10 Marks)**

SECTION – B

Answer **any 8** questions. **Each** carries **2 marks.**

11. Explain the Chandrasekhar limit.

12. Describe comets.

13. Describe neutron stars.

14. Explain the precession of Earth.

15. Explain the main features of the solar corona.

16. Explain the red shift of stars and its significance.

17. Mention the important features of sunspots.

18. Discuss the main features of the planet Jupiter.

19. What are Cepheid variables ?

20. What is gravitational lensing ?

21. Why is Pluto not considered a planet ?

22. Explain X-ray astronomy. **(8×2=16 Marks)**

SECTION – C

Answer **any 6** questions. **Each** carries **4 marks.**

23. Explain the scientific method used in Astronomy.

24. Describe the energy source of the sun.

25. State and explain Hubble's law.

26. What are the main features of Kuiper belt objects ?

27. Plot and explain HR diagram, marking the important regions.

28. What are the main characteristics of cosmic microwave background radiation ?

29. What is the solar wind ?

30. How is a black hole formed ?

31. How is energy produced in a quasar ? **(6×4=24 Marks)**

SECTION – D

Answer **any 2** questions. **Each** carry **15** marks.

32. Explain the main features of the big bang theory. Describe the observational evidences for it.

33. Describe in detail the structure of the sun.

34. Discuss the structure and classification of galaxies.

35. Describe the Harvard classification scheme of stars and explain the major varieties. **(2×15=30 Marks)**

(Pages : 3)

E – 1835

Sixth Semester B.Sc. Degree Examination, April 2018
Career Related FDP Under CBCSS
Group 2(a) – Physics and Computer Applications
Vocational Course
PC – 1672 : COMPUTER NETWORKS
(2014 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

PART – A
(Very Short Answer Questions)

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

1. Define the term bit rate.

2. Expand the term ISO OSI.

3. What do you mean by a domain server ?

4. What do you mean by collision ?

5. What are two framing mechanisms ?

6. What do you mean by connection oriented service ?

7. What is a router ?

8. Name any two unguided transmission media.

9. What do you mean by flow control ?

10. What is a multi point network ?   **(10×1=10 Marks)**

PART – B
(Brief Answer Questions)

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

11. What are various data communication methods ?

12. Define the term routing.

13. What are the benefits of slotted ALOHA ?

14. Write how remote login works.

15. Explain the use of packet switching technique.

16. What do you mean by physical address of a network ?

17. Write frame format of Token bus LAN standard.

18. Write applications where coaxial cable is used.

19. Write functions of presentation layer.

20. What do you mean by burst error ?

21. What do you mean by piggy backing ?

22. What is a hub ?

(8×2=16 Marks)

PART – C
(Short Essay Type Questions)

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

23. Discuss the functions of microwave transmission media.

24. Explain CSMA/CD protocol in detail.

25. Explain briefly the functions of data link layer in ISO OSI reference model.

26. Explain error detection methods in detail.

27. What is use of gateways in a network ?

28. Explain link state routing method.

29. Write a note on Ethernet standard.

30. Write a note on FTP.

31. Compare stop and wait ARQ and sliding window.   **(6×4=24 Marks)**

PART – D
(Long Essays)

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

32. Explain error correction techniques.

33. Explain various types of guided transmission media.

34. Explain briefly various congestion control techniques.

35. Write short note on :
    A) Bridge.
    B) Switch.   **(2×15=30 Marks)**

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