CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

PHYSICS

Paper I: Mathematical Physics, Properties of Materials and Relativity

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. a) **Answer any TEN of the following:**   10×1=10
   i)   If $\vec{A} \times \vec{B} = 0$, what is the angle between $\vec{A}$ and $\vec{B}$?
   ii)   What is Argand diagram?
   iii)   What are the types of differential equation?
   iv)   State Fourier's theorem.
   v)   What do you understand by a perfectly elastic body?
   vi)   What is the theoretical value of Poisson's ratio?
   vii)   Define force of cohesion.
   viii) What is the effect of temperature on viscosity?
   ix)   What is Coriolis force?
   x)   What is the value of rest mass of photon?
   xi)   What happens to the length of an object when it moves with the speed of light?
   xii)   Write the expression for the variation of mass with velocity.

   b) **Answer any FIVE of the following:**   5×2=10
   i)   Find the work done in moving an object along a vector $\vec{r} = \hat{i} + 2\hat{j} - \hat{k}$ if the applied force is $\vec{F} = 2\hat{i} + 2\hat{j} + 4\hat{k}$.
   ii)   What are the limitations of Fourier's analysis?
   iii) Write the expression for bending moment of a bar of
         a) rectangular cross section   b) circular cross section
   iv)   Distinguish between stream line and turbulent flow.
   v)   Explain the concept of time dilation.
   vi)   Show that simultaneity of events is only relative.

PART – B
UNIT – I

Answer any TWO of the following: 10×2=20

2. a) Define Planar vector. If $\vec{A}$ is a Planar rotating vector of constant magnitude and $\vec{A}_\perp$ is a vector of same magnitude in a perpendicular direction in the same plane show that
   $\frac{d\vec{A}}{d\theta} = \vec{A}_\perp$ and $\frac{d\vec{A}_\perp}{d\theta} = -\vec{A}$.
   b) A particle moves along the curve, $x = 2t^2$, $y = t^2 - 4t$, $z = 3t - 5$. Find the component of its velocity and acceleration at $t = 1$ in the direction $\hat{i} - 3\hat{j} + 2\hat{k}$.

3. a) Write the first order differential equation and discuss the methods of solving it.
   b) If a force $\vec{F} = -3x\hat{i} + \hat{j} + 5\hat{k}$ acts at the point whose position vector is $\vec{r} = 7\hat{i} + 3\hat{j} + \hat{k}$ find the magnitude of the force and the torque about the origin.   [6 + 4]

4. a) State Fourier's theorem and explain how amplitude terms in a Fourier series are evaluated.
   b) Transform $z = 2 + 2\sqrt{3}j$ into trigonometric and exponential forms.   [6 + 4]

UNIT – II

Answer any TWO of the following: 10×2=20

5. a) What is a torsional pendulum? Derive an expression for the period of oscillation of a torsion pendulum, assuming the expression for couple per unit twist.

    b) A square bar of length 1m, breadth 1cm and thickness 1cm at one end and a weight 1kg is applied at the other end. Calculate the depression of the loaded end.
    Given: $q = 9.8 \times 10^{10} Nm^{-2}$ and $g = 9.8ms^{-2}$. [6 + 4]

6. a) Give the theory of drop weight method of finding surface tension of a liquid.

    b) Determine the radius of a drop of water falling through air if it covers 4.8×10^{-2}m in 4 seconds with a uniform velocity. Assume density of air $1.21 kgm^{-3}$, η for air is $1.8 \times 10^{-5} Nsm^{-2}$ and $g = 9.8ms^{-2}$. [6 + 4]

7. a) Obtain stokes formula for viscous force acting on a body falling through a viscous medium.

    b) What would be the pressure inside a small air bubble of 0.1mm radius situated just below the surface of water? Surface tension of water is $0.072Nm^{-1}$ and atmospheric pressure is 1.03×10^5pa. [6 + 4]

UNIT – III

Answer any TWO of the following: 10×2=20

8. a) State and prove Galilean principle of relativity.

    b) With what velocity should a rocket move so that every year spent on it corresponds to 4 years on earth? [6 + 4]

9. a) Write Lorentz transformation equations and obtain an expression for length contraction.

    b) A spaceship is moving away from the earth with a velocity 0.6c. It fires a rocket towards the earth with velocity 0.7c relative to spaceship, what is the velocity of the rocket as observed from earth? [6 + 4]

10. a) Establish mathematically Einstein mass-energy relationship.

    b) At what speed will the mass of a body be 15.25 times its rest mass. [6 + 4]

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CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

PHYSICS
PAPER III: ACOUSTICS AND OPTICS

Duration: 3 Hours   **Max Marks: 80**

PART –A

1. (a) Answer any <u>TEN</u> of the following.   10X1=10

    i) What do you mean by acoustics?

    ii) Write the relation between energy and amplitude of Simple harmonic oscillations.

    iii) What is a progressive wave?

    iv) How to control noise pollution?

    v) What are interference fringes?

    vi) What are coherent sources?

    vii) Why do colour on a soap bubble change?

    viii) What are Newton's rings?

    ix) What is meant by half period elements?

    x) State the condition for secondary maxima in diffraction in a single slit.

    xi) What is diffraction grating?

    xii) Define resolving power.

(b) Answer any <u>FIVE</u> of the following.   5X2=10

    i) Define force constant and damping constant.

    ii) Distinguish between longitudinal and transverse waves.

    iii) Why should the two slits to be narrow, in Young's double slit experiment?

    iv) What is the difference between circular fringes of Michelson interferometer and Newton's rings?

    v) Describe how a zone plate is constructed.

    vi) Give any two differences between a prism spectrum and a diffraction grating spectrum.

PART-B

UNIT-I

Answer any TWO from the following: 2X10=20

2. (a) What are damped oscillations? Set up the equation for damped oscillation of a vibrating body.

   (b) A wave of frequency 500 Hz is travelling with a velocity 800 $m\ s^{-1}$. How far two points are situated whose displacement differs in phase by $\pi/4$ (6+4)

3. (a) Derive the expression for velocity of sound in air using Helmholtz resonator.

   (b) Calculate the percentage change in velocity of sound through air due to change in temperature from $20°C$ to $35°C$. $v_0 - 330\ m\ s^{-1}$ (6+4)

4. (a) Derive an expression for the velocity of transverse vibrations of a stretched string.

   (b) A wire of density $800\ kg\,m^{-3}$, $1\,m$ long, $1\,mm$ in diameter is stretched by a weight of $11\ kg$. Calculate the frequency of fundamental note. **(6+4)**

UNIT-II

Answer any TWO of the following.   **10x2=20**

5. (a) Give the theory of interference and deduce the conditions for constructive and destructive interference.

   (b) In a Newton's ring experiment, the diameter of 15th dark ring was found to be $0.59\ cm$. Find the diameter of 5th and 20th ring. **(6+4)**

6. (a) Describe with suitable theory, the method to determine wavelength of sodium light using biprism.

   (b) A prism is placed at a distance of $5\ cm$ in front of a narrow slit illuminated by sodium light of wavelength $589\ nm$ and the distance between the two virtual sources is found to be $0.05\ cm$. Find the width of the fringes observed in an eye piece placed at a distance of $0.75\ m$ from the biprism. **(6+4)**

7. (a) Describe the construction of Michelson interferometer and explain its working.

   (b) Light of wavelength $6000\ A^{\circ}$ falls normally on a thin wedge shaped film of refractive index 1.4, forming fringes that are $2\ mm$ apart. Find the angle of the wedge. **(6+4)**

UNIT-III

Answer any TWO of the following.   **10x2=20**

8. (a) Explain the diffraction pattern due to Fraunhoffer diffraction at a single slit. Explain the formation of maxima and minima.

   (b) Find the half angular width of the central bright maximum in the Fraunhoffer diffraction pattern of a slit width $12\times10^{-7}\ m$ when the slit is illuminated by monochromatic light of wavelength $600\ nm$. **(6+4)**

9. (a) Explain the formation of spectra by a plane diffraction grating. What are its chief characteristics?

   (b) Show that in a diffraction grating element $1.5\times10^{-6}\ m$ and light of wavelength $600\ nm$, third and higher order principal maxima are not visible. **(6+4)**

10. (a) Give Fresnel's theory of optical rotation.

    (b) The rotation of plane of polarization in a certain substance is 10^{0} per cm. Calculate the difference between the refractive indices for the right and left circularly polarized lights in the substance. Given $(\lambda = 589.3\ nm)$ **(6+4)**

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
PHYSICS
Paper V: Spectroscopy and Quantum Physics

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. a) **Answer any TEN of the following:**   10×1=10
    i)   Which experiment confirms electron spin?
    ii)   What is Planck's quantum hypothesis?
    iii)   What is zero point energy?
    iv)   Explain why the concept of orbits is irrelevant in wave mechanics.
    v)   Give the expression for the moment of inertia of a rigid rotor in terms of the reduced mass and bond length.
    vi)   Name one factor on which the threshold frequency depends.
    vii)   Write the de-Broglie wave equation.
    viii)   What is a free particle?
    ix)   If $j = {}^3/_2$ what are the possible values of l?
    x)   What are the different kinds of molecular spectra?
    xi)   Write Einstein's photo electric equation and explain the symbols.
    xii)   What do you understand by the wave function of a moving particle?

    b) **Answer any FIVE of the following:**   5×2=10
    i)   State and explain Franck-Condon principle.
    ii)   Explain J-J coupling for a multi electron system.
    iii)   Compare Compton effect with Raman effect.
    iv)   Draw a labeled diagram of Davisson - Germer's apparatus for the detection of matter waves.
    v)   Define expectation value and explain its significance.
    vi)   Draw the energy level diagram for a harmonic oscillator.

PART – B
UNIT – I

Answer any TWO of the following: 2×10=20
2. a) What is meant by fine structure of spectral lines? Explain the fine structure of sodium D Line.
    b) With an exciting radiation of wavelength 589.3nm, a substance showed a Raman line at a wavelength of 578.7nm. Find the wavelength and frequency of the corresponding stokes lines.   [6 + 4]

3. a) Explain Raman effect on the basis of quantum theory. Explain the origin of stokes and anti-stokes lines in Raman spectrum.
    b) What magnetic flux density is required to observe a Zeeman shift of 0.01nm for a spectral line of wavelength 550nm.   [6 + 4]

4. a) Derive an expression for magnetic dipole moment of electron due to orbital motion. Hence deduce the expression for gyromagnetic ratio.

b) In the stern-Gerlach experiment, a beam of silver atoms passes through a magnetic field of gradient 1.5Tmm^{-1}, which is along the Z-axis. The length of the path in the field is 3.5cm. The speed of atoms is 750 m s^{-1}. Find the displacement of the atoms in the +ve Z-direction when they emerge from the field. The mass m of a silver atom is 1.8×10^{-25} kg and the Bohr magneton is 9.27×10^{-24}JT^{-1}. [6 + 4]

UNIT – II
Answer any TWO of the following: 2×10=20
5. a) State Heisenberg's uncertainty principle and derive it from a hypothetical gamma ray microscope.
   b) Ultraviolet light of wavelength 280nm is used in experiment on photoelectric effect with lithium cathode. Find (a) the maximum kinetic energy of the photoelectrons and b) the stopping potential. Given: work function = 2.5eV. [6 + 4]

6. a) Discuss Planck's quantum hypothesis and deduce Planck's law of energy distribution for black body radiation.
   b) In Davisson - Germer experiment on electron diffraction studied with a nickel crystal having inter-atomic distance of 0.91Å with electron, the kinetic energy is 54eV. If the result obtained verifies the wavelength of electron, locate the position of principal maximum in the first order. [6 + 4]

7. a) Derive an expression for Compton shift and wavelength of scattered photon.
   b) An aluminium foil of relative emittance 0.1 is placed in between two concentric spheres at temperatures 300K and 200K respectively. Calculate the temperature of the foil after the steady state is reached. Assume that the spheres are perfect black body radiators. Also calculate the rate of energy transfer between one of the spheres and the foil. ($\sigma = 5.672 \times 10^{-8}$ SI units) [6 + 4]

UNIT – III
Answer any TWO of the following: 2×10=20
8. a) Write down the Schrödinger wave equation and obtain expression for energy of a linear harmonic oscillator and discuss energy level diagrams.
   b) In a one dimensional potential well of infinite height and width of 0.1nm, find the probability of finding an electron in its first excited state between x = 0.04nm and x = 0.06nm. [6 + 4]

9. a) Write down the Schrödinger wave equation for a free particle in a linear potential box and discuss the curves of wave function and probability.
   b) An electron is put in a cubical box of each side 1Å. Find the values of its momentum and energy for the ground and the first excited state. [6 + 4]

10. a) Obtain one dimensional time independent Schrödinger wave equation from time dependent Schrödinger wave equation.
    b) A particle of mass 1 mg is attached to a spring of spring constant 10^{-3}Nm^{-1}. Calculate its zero point energy and classical value of amplitude of zero point vibration.[6 + 4]

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
PHYSICS
Paper VI: Solid State Physics

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. a) **Answer any TEN of the following:**   10×1=10

    i)   What are Bosons?
    ii)   What is Einstein's temperature?
    iii) Define mean free path.
    iv)   What is Hall Effect?
    v)   Draw the energy band diagram for a semiconductor.
    vi)   Give two differences between a n type and p type semiconductor.
    vii) What is photo voltaic effect?
    viii) What is depletion region?
    ix)   How are continuous X-rays produced?
    x)   What are point defects?
    xi)   How are electronic defects formed?
    xii) Define spin exchange interaction.

    b) **Answer any FIVE of the following:**   5×2=10

    i)   Compare classical and quantum distribution laws.
    ii)   From the equation J = σE for a metal, arrive at Ohm's law.
    iii) What is the difference between avalanche and Zener breakdown?
    iv)   Give any two applications of solar cell.
    v)   State Mosley's law and give its significance.
    vi)   Mention the seven crystal systems.

PART – B
UNIT – I

Answer any TWO of the following: 2×10=20

2. a) Assuming Debye's expression for energy, discuss the results at very low and very high temperatures.
   b) Debye temperature for a crystal is 2000 K and its density is 3500 kg m^{-3}. Assuming that the transverse and longitudinal components of velocities are equal, calculate the velocity of sound in the crystal.
   Given: Atomic weight = 12, Avogadro Number = 6.023×10^{26} kg mole^{-1}
   k = 1.38 × 10^{-23} J K^{-1},   h = 6.625 × 10^{-34} J s.   [6 + 4]

3. a) Describe how Hall coefficient can be determined experimentally.
   b) Sodium has density 970 kg m^{-3}, atomic weight 23 and electrical conductivity 2.1 × 10^7 mho m^{-1}. Calculate i) The concentration of conduction electrons
                                ii) Relaxation time   [6 + 4]

4. a) Get an expression for Fermi energy at 0K assuming the expression for density of energy states.
   b) In a Hall coefficient experiment, a current of 0.25A is sent through a metal strip having thickness 0.2mm and width 5mm. The Hall voltage is found to be 0.15mV. When a magnetic field of 0.2T is used, i) What is the carrier concentration?
   ii) What is drift velocity of carriers? [6 + 4]

UNIT – II

Answer any TWO of the following: 2×10=20

5. a) With the help of an energy band diagram explain the effect of forward bias of a p – n diode.
   b) The resistance of intrinsic semiconductor is equal to 180Ω at $60°C$ and 80Ω at $80°C$. Calculate energy gap of semiconductor.
      Given $k = 1.38 \times 10^{-23}$ J K^{-1}. [6 + 4]

6. a) Derive an expression for the electrical conductivity of an intrinsic semi conductor.
   b) The resistivity of Germanium at $27°C$ is equal to $0.47\ \Omega m$. Assuming electron and hole mobilities as 0.38 and 0.18 $m^2\ V^{-1}s^{-1}$ respectively, calculate the intrinsic carrier density. [6 + 4]

7. a) Explain static, dynamic forward and reverse bias resistances of a p – n diode using its VI characteristics.
   b) Find the static resistance of a p – n junction germanium diode if the temperature is $27°C$ and $I_0 = 2\mu A$ for an applied voltage of 0.2V. [6 + 4]

UNIT – III

Answer any TWO of the following: 2×10=20

8. a) What are Miller indices? Illustrate with examples by considering any three planes.
   b) An X-ray tube operates at 40kV. Find the maximum speed of electrons striking the anticathode and shortest wave length of X-rays produced. [6 + 4]

9. a) What is edge dislocation and screw dislocation? Explain with diagrams. Give the differences between the two.
   b) X-rays of 0.07nm wavelength are reflected from the (1 10) plane of a rock salt crystal with lattice constant 0.282nm. Calculate the glancing angle corresponding to second order reflection. [6 + 4]

10. a) Explain the origin of diamagnetism in materials. Obtain an expression for diamagnetic susceptibility using the Langevin's theory.
    b) A beam of X-rays of wavelength 0.0842nm is incident on a crystal at a grazing angle of $8°35^1$ when the first order Bragg's reflection occurs. Calculate the facing angle for 3rd order reflection. [6 + 4]

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CHE 101.1 Reg. No. ....

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

CHEMISTRY

PAPER I: GENERAL CHEMISTRY

Duration: 3 hours   Max marks: 80

PART A

1. **Answer any TEN of the following:**   10x2=20

   a) What are agrochemicals? Give an example.

   b) Balance the following equation by Hit & Trial method.

      $$Fe_2O_3 + CO \rightarrow Fe + CO_2$$

   c) How does the ionization potential vary along the period and down the group in the periodic table?

   d) Give reason: size of alkali metals increases down the group.

   e) Write the expression for Joule Thomson Coefficient? Explain the terms.

   f) Define heat capacity at constant volume C_V.

   g) State the second law of thermodynamics.

   h) State Carnot theorm.

   i) Predict, whether cyclobutadiene is aromatic or non aromatic.

   j) What are carbenes? Give an example?

   k) What is Diels Alder reaction?

   l) Write the conformational structures of cyclohexane.

PART-B
UNIT-I

Answer any **TWO** of the following.   2x10=20

2. a) Explain the trends in the periodic table with respect to reducing and oxidizing nature of elements.   04

   b) With suitable examples explain the classification of chemicals based on application.   03

   c) Define electronegativity. Give the mathematical expression for Pauling's scale of electronegativity.   03

3. a) Explain the determination of electron affinity by Born-Haber cycle.   04

   b) How are metallic or non metallic properties of elements predicted using ionization energy and electronegativity?   03

   c) Explain the factors affecting the isonisation energy.   03

4. a) Balance the following equation by ion electron method.

      $$Fe^{+2} + MnO_4^- \rightarrow Fe^{+3} + Mn^{+2}$$ 04

   b) Define electron affinity. Explain why electron affinity of fluorine is less than that of chlorine.   03

   c) How is ionic radius determined by Lande's method?   03

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UNIT-II

Answer any __TWO__ of the following. 2x10=20

5. a) Explain Carnot's cycle and derive an expression for its efficiency. 04

   b) Derive the relationship between C_P & C_V. 03

   c) Six moles of an ideal gas expand isothermally and reversibly from a volume of $1dm^3$ to a volume of $10dm^3$ at $27°C$. What is the maximum work done? R = 8.314J/K/mol. 03

6. a) Derive an expression for entropy change for an ideal gas associated with temperature and pressure change. 04

   b) Show that Joule Thomson effect is an isoenthalpic process. 03

   c) Calculate the amount of heat supplied to Carnot's cycle working between 348K and 268K if the maximum work obtained is 890J. 03

7. a) Derive Kirchoff's equation at constant pressure. 04

   b) Explain the variation of Gibbs free energy with temperature and pressure. 03

   c) One mole of an ideal gas is heated from 100K to 300K. Calculate ΔS if

       a) the volume is kept constant

       b) the pressure is kept constant

   (Assume that $C_V = 1.5R$) 03

UNIT-III

Answer any __TWO__ of the following. 2x10=20

8. a) Explain Baeyer's strain theory. Write any 2 limitation of Baeyer's strain theory.04

   b) Explain the mechanism of aldol condensation. 03

   c) What are the criteria for aromaticity? 03

9. a) How do you prepare 1, 3 – butadiene with reference to

       (i) dehydration of diols   (ii) dehydrogenation of alkanes 04

   b) Explain the mechanism of addiction of HBr to propene. 03

   c) What are carbanions? Explain the stability of carbanions. 03

10. a) Explain the mechanism of Friedel Craft's alkylation. 04

    b) What is inductive effect? Explain +I & – I effect with examples. 03

    c) How is stability of higher cycloalkanes explained on the basis of Sasche-Mohr theory? 03

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CHE 301.2   Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
CHEMISTRY
PAPER III: GENERAL CHEMISTRY
Duration: 3 hours   Max marks: 80

PART A

1. Answer any <u>TEN</u> of the following: 10x2=20

    a) Fluorine does not show positive oxidation state. Give reason.

    b) What is the oxidation state of sulphur in sulphuric acid and nitrogen in nitric oxide?

    c) H_2O is a liquid, while H_2S is a gas. Give reason.

    d) What are Clathrates? Give an example?

    e) What is meant by critical phenomenon?

    f) What is Joule-Thomson effect?

    g) Define surface tension. Write its SI unit.

    h) State the law of rationality of indices.

    i) Explain the cleavage of ethers by an acid.

    j) How is benzoin obtained?

    k) Which acid is the strong acid among chloroacetic acid and acetic acid? Why?

    l) What is HVZ reaction? Give an example.

PART-B
UNIT-I

Answer any <u>TWO</u> of the following.   2x10=20

2. a) Give any four applications of carbides in industry.   04

    b) Explain banana bonding in diborane.   03

    c) How are the following prepared?   03

        (i) XeF_2 (ii) XeF_6

3. a) Discuss the variation in properties of group 14 elements with reference to

        (i) Oxidation state (ii) Ionisation energy   04

    b) What are interhalogen compounds? What are the different types of interhalogen compounds? Give an example for each type.   03

    c) Name any three types of silicates and give their structure.   03

4. a) What are hydrides? Write a note on hydrides of group 14 elements. 04

    b) What is inert pair effect? Give two examples to support your answer. 03

    c) Compare the oxidation states of Group 15 elements.   03

UNIT-II

Answer any **TWO** of the following.   2x10=20

5.   a)   Explain the determination of crystal structures of NaCl by Bragg's method.   04

     b)   Explain the principle and determination of surface tension by drop number method.

                                                    03

     c)   Explain the PV-isotherm of carbon dioxide.   03

6.   a)   Derive Bragg's equation $n\lambda = 2d \sin \theta$.   04

     b)   Explain the principle and determination of viscosity by using Ostwald's viscometer.   03

     c)   Explain the liquefaction of gas by Claude's method.   03

7.   a)   Derive the expressions for critical constants T_c, V_c and P_c in terms of van der Waal's constants.   04

     b)   Explain the intermolecular forces in liquids.   03

     c)   What are the Miller indices of a crystal plane intercepts 2 and 3 on X and Y axes respectively and parallel to the Z-axis.   03

UNIT-III

Answer any **TWO** of the following.   2x10=20

8.   a)   How is anisole and phenatole prepared.   04

     b)   Explain the mechanism of aldol condensation.   03

     c)   Explain the mechanism for the acid hydrolysis of an ester.   03

9.   a)   Explain with suitable example – the use of acetals as protecting groups?   04

     b)   What is the action of heat on adipic acid and oxalic acid?   03

     c)   Explain the base catalysed cleavage reactions of ethylene oxide.   03

10.   a)   Give any one method of preparation of

           (i) acid chlorides (ii) amides   04

     b)   Explain Friedel – Craft's acylation reactions.   03

     c)   Explain the mechanism of Perkins condensation.   03

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CHE 501.2   Reg. No. ....

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

CHEMISTRY
PAPER V: GENERAL CHEMISTRY

Duration: 3 hours   Max marks: 80

PART A

1. Answer any <u>TEN</u> of the following: 10x2=20

   a) Write Schrodinger wave equation and explain the terms.

   b) Write the possible values of l and m for the electrons in 3d orbitals.

   c) Write the I UPAC names of (i) $K_3[Co(NO_2)_6]$ (ii) $[Fe(C_2O_4)_3]^{3-}$ ion.

   d) What is hydrate isomerism? Give an example.

   e) Write the Gibb's phase rule and explain the terms.

   f) Explain the following terms with suitable example:

      i) Congruent melting point (ii) Reduced phase rule

   g) Define ionic mobility and equivalent conductance.

   h) Write Debye-Huckel Onsager equation and explain the terms.

   i) Assign E and Z configuration for the following:
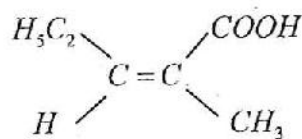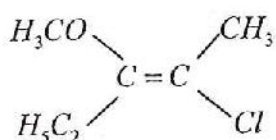
   j) Explain why racemic tartaric acid can be resolved but not mesotartaric acid.

   k) What is Lobry de Bruyn and Van Ekenstein rearrangement?

   l) How does glucose react with (i) Bromine Water (ii) Hydrogen Cyanide.

PART-B
UNIT-I

Answer any <u>TWO</u> of the following.   2x10=20

2. a) Explain Hamiltonian Operator.   03

   b) State and explain Heisenberg's uncertainity principle.   03

   c) Explain the promotion of complex $[Ni(CN)_4]^{2-}$ using VBT and account for its
      magnetic property.   04

3. a) Explain de-Broglie hypothesis.   03

   b) Explain Planck's quantum law of radiation.   03

   c) Discuss geometrical isomerism in compounds with co-ordination number 6.   04

4. a) What are ligands? How are they classified? Give example.   03
   b) Explain co-ordination and linkage isomerism with example.   03
   c) Write the expression for energy of a particle in one dimensional box.
   How can you justify the following :
      (i) quantization of energy   (ii) Existence of zero point energy.   04

UNIT-II

Answer any **TWO** of the following.   2x10=20

5. a) Define Kohlrausch's law and give any two applications.   03
   b) Calculate the solubility product of AgCl from the following data : specific conductivity of water is $0.65 \times 10^{-4} Sm^{-1}$ and of AgCl is $2.75 \times 10^{-4} Sm^{-1}$. Molar conductance at infinite dilution of Ag^+ and Cl^- are $61.72 \times 10^{-4} Sm^{-2} mol^{-1}$ & $76.34 \times 10^{-4} Sm^{-2} mol^{-1}$ respectively.   03
   c) Explain the phase diagram of sulphur system.   04

6. a) Discuss the conductometric titration curve obtained in the titration of
      (i) Mixture of strong and weak acids Vs strong base
      (ii) Weak acid against strong base   03
   b) At 285K, the equivalent conductance at infinite dilution of HCl, NaCl and CH_3COONa are 380×10^{-4}, 109×10^{-4}, $78.5 \times 10^{-4} Sm^2 eq^{-1}$ respectively. Calculate the equivalent conductance of acetic acid at infinite dilution.   03
   c) Explain the phase diagram of Sodium Chloride-Water system.   04

7. a) What is meant by component of a system? Explain two component system with suitable examples.   03
   b) Write a note on freezing mixtures.   03
   c) Explain the experimental method for the determination of equivalent conductance of a strong electrolyte of given concentration.   04

UNIT-III

Answer any **TWO** of the following.   2x10=20

8. a) Discuss the structure of starch.   03
   b) Explain the mechanism of mutarotation.   03
   c) What are conformational isomers? Discuss the conformational isomers of ethane   04

9. a) Discuss the geometrical isomerism in cyclohexanes.   03
   b) What are enantiomers? How do they differ from diastereomers.   03
   c) How is the ring size of glucose determined?   04

10. a) How is glucose converted to mannose?   03
    b) Explain Kiliani-Fischer synthesis with an example.   03
    c) Explain the mechanism of osazone formation.   04

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
CHEMISTRY
PAPER VI: GENERAL CHEMISTRY

Duration: 3 hours   Max marks: 80

PART A

1. Answer any <u>TEN</u> of the following: 10x2=20

   a) What are lathanides? Give their general electronic configuration?

   b) Atomic radii of Zr and Hf are almost same why?

   c) What is a soft base? Give an example.

   d) Define solvation energy.

   e) Write Morse equation for potential energy of an anharmonic oscillator and explain the terms.

   f) CO_2 does not give rotational spectra. Give reason.

   g) How many PMR signals are obtained in the case of bromoethane and acetone?

   h) Define Stokes and antiStokes lines.

   i) How is malonic ester prepared? Write the chemical equation.

   j) Explain the reaction of methyl magnesium iodide with ethyl alcohol.

   k) Give the keto-enol structure of ethyl acetoacetate.

   l) What are chromophores? Give an example.

PART-B
UNIT-I

Answer any **TWO** of the following.   2x10=20

2. a) Differentiate between conductors, semi conductors and insulators on the basis of band theory.   04

   b) Describe ion exchange method of isolation of lanthanides.   03

   c) Mercury and lead ions are highly toxic. Why?   03

3. a) What is lanthanides contraction? Explain its cause and consequences. 04

   b) How does HSAB principle govern the occurrence of minerals?   03

   c) Write a note on polarization and polarizing power.   03

4. a) Illustrate Fajan's rules with suitable examples.   04

   b) Explain how lattice energy of NaCl crystal is calculated using Born-Haber cycle.   03

   c) Describe the complexation tendencies of f-block elements.   03

UNIT-II

Answer any **TWO** of the following.   2x10=20

5. a) How does the PMR spectrum of a compound help to elucidate the structure of a compound.   04

    b) Write an expression for vibrational energy of a diatomic molecule taking it as a simple harmonic oscillator. Sketch the vibrational energy levels of such molecules.
                                                                            03

    c) How are moment of inertia and bond length of a molecule determined from its rotational spectrum?   03

6. a) Define force constant. Calculate force constant for HCl bond if its fundamental frequency is $8.667 \times 10^{13} Hz$, mass of $H = 1.6739 \times 10^{-27} kg$ and mass of $Cl = 5.895 \times 10^{-26} kg$.   04

    b) Explain quantum theory of Raman scattering.   03

    c) Derive an expression for moment of inertia of a diatomic molecule in terms of atomic masses and bond length.   03

7. a) Explain shielding and deshielding effect in NMR spectroscopy.   04

    b) Show that the frequency separation of successive lines in pure rotational spectra of rigid diatomic molecule is 2B.   03

    c) What are the differences between Raman and IR spectroscopy?   03

UNIT-III

Answer any **TWO** of the following.   2x10=20

8. a) Explain the preparation of ethyl acetoacetate. Give its mechanism.   04

    b) Write the synthesis of methyl orange.   03

    c) Explain Meerwin Pondorf Verley reduction with an example.   03

9. a) Explain the classification of dyes based on method of application.   04

    b) Give the synthesis of crotonic acid from diethyl malonate.   03

    c) Explain Oppenauer oxidation with an example.   03

10. a) Write a note on (i) mordant dye (ii) vat dye.   04

    b) Explain Wagner-Meerwin rearrangement reaction.   03

    c) Enumerate the various kinds of electronic transitions taking place in dyes.   03

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PART - B

UNIT-I

2. a) State and prove Rolle's theorem. (6)

   b) For the function $f(x) = x^{1/3}$, find the points of inflection of the graph of f and determine where the graph is concave upward and where it is concave downward. (6)

   c) Let c be a critical number of a function f at which $f'(c) = 0$ and let f' exist for all values of x in some open interval containing c. If $f'(c)$ exists and if $f''(c) < 0$, then prove that f has a relative maximum value at c. (6)

3. a) Find the dimensions of the right circular cylinder of greatest volume that can be inscribed in a right circular cone with a radius of 5 cm and a height of 12 cm. (6)

   b) If $f(x) = -4x^3 + 3x^2 + 18x$, then find the relative extrema of f using second derivative test. (6)

   c) State and prove mean value theorem. (6)

UNIT-II

4. a) Let f and g be functions that are differentiable on an open interval I, except possibly at the number a in I. Suppose that for all $x \neq a$ in I, $g'(x) \neq 0$. If $\lim_{x \to a} f(x) = 0$, $\lim_{x \to a} g(x) = 0$

   $\lim_{x \to a} \frac{f'(x)}{g'(x)} = L$ then prove that $\lim_{x \to a} \frac{f(x)}{g(x)} = L$ (6)

   b) Sketch the graph $f(x) = 2x^3 - 6x + 1$ (6)

   c) Find $\lim_{x \to 0} \left(\frac{1}{x^2} - \frac{1}{\sec^2 x} \right)$ (6)

5. a) State and prove Cauchy's mean value theorem. (6)

   b) Derive Taylor polynomial of degree 3 for $f(x) = \frac{1}{x-2}$ at $a = 1$ (6)

   c) Draw the sketch of four leaved rose $r = 4\cos 2\theta$ (6)

UNIT-III

6. a) Find the exact value of $\int_0^2 x^2 dx$ as a limit of Riemann sum with regular partitions and for suitable choice of ξ_i (6)

   b) Evaluate $\int_0^{\pi/2} \sin^n x \, dx$ where n is a positive integer. (6)

   c) Find an approximation for $\int_0^3 \frac{dx}{16 + x^2}$ using trapezoidal rule for n = 6. (6)

7. a) If the function f is continuous on the closed interval [a, b] and x is any number in [a, b] and if F is the function defined by $F(x) = \int_a^x f(t) dt$, then prove that $F'(x) = f(x)$. (6)

   b) Evaluate $\int \frac{\sqrt{x}}{1 + \sqrt[3]{x}} dx$ (6)

   c) Find the reduction formula for $\int \sec^n x \, dx$ (6)

UNIT-IV

8. a) Find the volume of the solid generated by revolving about the line y = 2, the region bounded by the curve $y = \sqrt{x}$, the x-axis and the line x = 4. (6)

   b) If the base of a solid is the region enclosed by a circle with radius r units and if all plane sections perpendicular to a fixed diameter of the base are squares, then find the volume of the solid. (6)

   c) Compute the length of the segment of the line $4x + 9y = 36$ between its x and y intercepts by using the arc length formula. (6)

9. a) Find the volume of the solid generated by revolving about the x – axis, the region bounded by the parabola $y = x^2 + 1$ and the line $y = x + 3$. (6)

   b) Find the area of the region enclosed by the graph of $r = 3\cos\theta$ (6)

   c) A wedge is cut from a right circular cylinder with a radius of r cm by two planes, one perpendicular to the axis of the cylinder and the other intersecting the first along a diameter of the circular plane section at an angle of measurement 60°. Find the volume of the wedge. (6)

UNIT-V

10. a) State and prove division algorithm. **(6)**

   b) Use Euclidean algorithm to obtain integers x and y satisfying
   $gcd\,(1769, 2378) = 1769x + 2378y$ **(6)**

   c) Determine all solutions in the integers of the Diophantine equation $221x + 35y = 11$ **(6)**

11. a) If a and b are integers not both zero, then prove that a and b are relatively prime if and only if there exist integers x and y such that $ax + by = 1$ **(6)**

   b) If $a = bq + r$, then prove that $gcd\,(a,\,b) = gcd\,(b,\,r)$. **(6)**

   c) If a cock is worth 5 coins, a hen 3 coins and three chicks together 1 coin, then how many cocks, hens and chicks totaling 100 can be bought for 100 coins? **(6)**

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Note: 1. Answer any TEN questions in Part A. Each question carries 3 marks.
   2. Answer FIVE full questions from Part B choosing ONE full question from each unit.

PART A   3x10=30

1. a) Find the critical numbers of the function $h(x) = \dfrac{x-3}{x+7}$.

   b) Find the value of c satisfying the mean value theorem for the function $f(x) = x^4 - 5x^2 - 3x$ in $(1, 3)$.

   c) Find the relative extrema of the function $f(x) = x^4$.

   d) Find the vertical and horizontal asymptotes of the graph of the function $f(x) = \dfrac{8x - 2x^2}{x^2 - 9}$

   e) Evaluate $\lim\limits_{t \to 0} \dfrac{\sin^2 t}{\sin t^2}$

   f) Find a polar equation of $x^2 + y^2 - 4x = 0$.

   g) Evaluate $\displaystyle\int_0^{\pi/2} \sin^5 x \cos^6 x \, dx$

   h) Find the value of χ such that $\displaystyle\int_1^3 f(x)dx = f(\chi)(3-1)$ if $f(x) = x^2$

   i) Evaluate $\displaystyle\int x^2 e^{2x}\, dx$.

   j) Find the length of the arc of the curve $9y^2 = 4x^3$ from the origin to the point $\left(3, 2\sqrt{3}\right)$.

   k) Find the volume of the sphere generated by revolving about a diameter, the region enclosed by the circle $x^2 + y^2 = r^2$

   l) Find the area of the region enclosed by the graph of the equation $r = \theta$ from $\theta = 0$ to $\theta = \dfrac{3\pi}{2}$

   m) Show that $\dfrac{a(a^2 + 2)}{3}$ is an integer for all $a \geq 1$

   n) If $a \mid bc$ with $gcd\,(a, b) = 1$, then prove that $a \mid c$.

   o) Find whether the Diophantine equation $6x + 51y = 22$ has a solution or not.

PART - B

UNIT-I

2. a) Prove that $\lim_{(x,y)\to(2,4)} x^2 + 2x - y = 4$ y applying $\in -\delta$ definition. **(6)**

   b) If $u = xy + xz + yz$, $x = rs$, $y = r^2 - s^2$, $z = (r-s)^2$ find $\dfrac{\partial u}{\partial r}$ and $\dfrac{\partial u}{\partial s}$ using chain rule. **(6)**

   c) Find the equation of the tangent line to the curve of intersection of $y = x^2$, $y = 16 - z^2$ at the point $(4, 16, 0)$ **(6)**

3. a) If $f(x,y) = \begin{cases} \dfrac{xy(x^2 - y^2)}{x^2 + y^2} & if\ (x,y) \neq (0,0) \\ 0 & if\ (x,y) = (0,0) \end{cases}$

   Find $f_{12}(0,0)$ **(6)**

   b) If $f(x,y,z) = \cos xy + \sin yz$, find the rate of change of $f(x,y,z)$ at $(2,0,-3)$ in the direction of the vector $\dfrac{-1}{3}i + \dfrac{2}{3}j + \dfrac{2}{3}k$ **(6)**

   c) If $f(x,y) = x^3 + y^2 - 6x^2 + y - 1$ find the relative extrema of f if any. **(6)**

UNIT-II

4. a) Find an approximate value of the double integral $\iint\limits_R (xy + 3y^2)dA$, where

   R is the rectangular region having vertices $P(-2, 0)$ and $Q(4, 6)$. Take the partition of R formed by the lines $x_1 = -2$, $x_2 = 0$, $x_3 = 2$ & $y_1 = 0$, $y_2 = 2$, $y_3 = 4$ **(6)**

   b) Find by double integration, the area of the region inside the cardioid $r = 2(1 + \sin\theta)$ **(6)**

   c) Find the volume of the solid bounded by the surface $f(x,y) = 4 - \dfrac{1}{9}x^2 - \dfrac{1}{16}y^2$, the planes $x = 3$ and $y = 2$, and the coordinate planes. **(6)**

5. a) Evaluate $\iint\limits_R x^2\sqrt{9 - y^2}\ dA$ where R is the region bounded by the circle $x^2 + y^2 = 9$ **(6)**

   b) Find the volume of the solid in the first octant bounded by the two cylinders $x^2 + y^2 = 4$ and $x^2 + z^2 = 4$ **(6)**

   c) Find the area of the surface in the first octant that is cut from the cylinder $x^2 + y^2 = 9$ by the plane $x = z$. **(6)**

UNIT-III

6. a) Find the volume of the solid above the elliptic paraboloid $3x^2 + y^2 = z$ and below the cylinder $x^2 + z = 4$. **(6)**

   b) Suppose a particle moves along the parabola $y = x^2$ from the point $(-1,1)$ to the point $(2,4)$. Find the total work done if the motion is caused by the force field $F(x,y) = (x^2 + y^2)i + 3x^2 y j$. Assume that the arc is measured in meters and the force is measured in newtons. **(6)**

   c) A homogeneous solid in the shape of a right circular cylinder has a radius of 2m and an altitude of 4m. Find the moment of interia of the solid with respect to its axis. **(6)**

7. a) Evaluate $\displaystyle\int_0^{\pi/4} \int_0^{2a\cos\phi} \int_0^{2\pi} \rho^2 \sin\phi\, d\theta\, d\rho\, d\phi$ **(6)**

   b) A particle traverses the twisted cubic $\vec{R}(t) = ti + t^2 j + t^3 k$, $0 \leq t \leq 1$. Find the total work done if the motion is caused by the force field $F(x,y,z) = e^x i + xe^z j + x\sin(\pi y^2)k$. Assume that the arc is measured in meters and the force is measured in newtons. **(6)**

   c) Evaluate the line integral $\displaystyle\int_c (x^2 + xy)dx + (y^2 - xy)dy$ where C: the line $y = x$ from the origin to the point $(2,2)$ **(6)**

UNIT-IV

8. a) Prove that subgroup of a cyclic group is cyclic. **(6)**

   b) If H and K are two subgroups of G, prove that HK is a subgroup of G if and only if HK = KH. **(6)**

   c) Write the permutation $\begin{pmatrix} 1 2 3 4 5 6 7 8 9 \\ 2 3 4 5 1 6 7 9 8 \end{pmatrix}$ as the product of disjoint cycles. Find its order. Determine whether it is odd or even. **(6)**

9. a) If G is a group and H is a subgroup of G, then show that the relation $a \equiv b \bmod H$ is an equivalence relation. **(6)**

   b) State and prove Lagrange's theorem for groups. **(6)**

   c) Show that S_n has as a normal subgroup of index 2 the alternating group, A_n, consisting of all even permutations. **(6)**

UNIT-V

10. a) Prove that a subgroup N of a group G is a normal subgroup of G if and only if
$gNg^{-1} = N$ for every $g \in G$ (6)

    b) If G and $\overline{G}$ are groups and $\phi : G \rightarrow \overline{G}$ is a homomorphism, prove that
$Ker\phi$ is a normal subgroup of G.   (6)

    c) If G is any group, prove that the mapping $i_x : G \rightarrow G$ defined by
$i_x(g) = xgx^{-1}$, $\forall g \in G$ where $x \in G$, is an automorphism.   (6)

11. a) Prove that a subgroup N of a group G is a normal subgroup of G if and only if the product of
any two right cosets of N in G is again a right coset of N in G.   (6)

    b) If ϕ is a homomorphism of a group G onto $\overline{G}$ with Kernel K, prove that
G/K is isomorphic to $\overline{G}$ (6)

    c) Define centre of a group. Prove that centre of a group is a normal subgroup of G.   (6)

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CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
MATHEMATICS
PAPER III: FUNCTIONS OF SEVERAL VARIABLES, MULTIPLE INTEGRALS AND
GROUP THEORY

Duration: 3 hours   Max Marks: 120

Note: 1. Answer any TEN questions in Part A. Each question carries 3 marks.
     2. Answer FIVE full questions from Part B choosing ONE full question from each unit.

PART A   3x10=30

1. a) Find the domain of $F \circ G$ if $F(x) = sin^{-1}x$ and $G(x, y, z) = \sqrt{x^2 + y^2 + z^2 - 4}$

    b) If $f(x, y, z) = 4xyz + \ln(2xyz)$ find $f_z(x, y, z)$

    c) If $g(x, y) = \ln\sqrt{x^2 + y^2}$, find $\nabla g(x, y)$

    d) Evaluate the iterated integral $\int_{\pi/2}^{\pi} \int_0^x \sin(4x - y)\, dy\, dx$

    e) Find the volume of the solid in the first octant bounded by the cone $z = r$ and the cylinder
$r = 3\sin\theta$

    f) Find the area of the surface that is cut from the cylinder $x^2 + z^2 = 16$ by the planes
$x = 0, x = 2, y = 0$ and $y = 3$.

    g) Evaluate $\int_0^{\pi/2} \int_0^{\pi/2} \int_0^{xz} \cos\frac{y}{z}\, dy\, dx\, dz$.

    h) Evaluate the line integral $\int_C 3x\, dx + 2xy\, dy + z\, dz$ where $x = \cos t, y = \sin t, z = t, 0 \leq t < 2\pi$

    i) Evaluate the iterated integral $\int_0^{\pi} \int_2^4 \int_0^1 re^z dz\, dr\, d\theta$

    j) If G is a finite group, and $a \in G$, prove that O(a) divides O(G)

    k) If G is a group and H is a subgroup of G, prove that any two left cosets of H in G have the
same number of elements.

    l) If H and K are subgroups of G and $O(H) > \sqrt{O(G)}$, $O(K) > \sqrt{O(G)}$, then prove that
$H \cap K \neq \{e\}$

    m) If G is abelian group, prove that every subgroup of G is normal subgroup.

    n) If $\phi : G \rightarrow \overline{G}$ is a homomorphism of groups and if $ker\phi = \{e\}$, then prove that ϕ is one to
one.

    o) If $\phi : G \rightarrow G'$ is defined by $\phi(a) = e'$ $\forall a \in G$, then prove that ϕ is a homomorphism and
find its kernel.

c) Let there be a set of tasks and 'ω' denote the total elapsed time when the tasks are executed according to a schedule that contains no intentional idle periods. If the number of processors in the computing system is 2, then show that $\frac{\omega}{\omega_0} \leq \frac{3}{2}$ where ω_0 denotes the minimum possible total elapsed time. (6)

3. a) Provide a step–by–step derivation to generate the sentence $C = A + D * (D + B)$ using following set of productions. (6)

$$Asgn\_stat \rightarrow id = exp$$
$$exp \rightarrow exp + term$$
$$exp \rightarrow term$$
$$term \rightarrow term * factor$$
$$term \rightarrow factor$$
$$factor \rightarrow (exp)$$
$$factor \rightarrow id$$
$$id \rightarrow A$$
$$id \rightarrow B$$
$$id \rightarrow C$$
$$id \rightarrow D$$

b) If no three diagonals of a convex decagon meet at the same point inside the decagon, into how many line segments are the diagonals divided by their intersection? (6)

c) Let $(P, \leq)$ be a partially ordered set in which the length of the longest chain is 'n'. Show that the elements in P can be partitioned into 'n' disjoint antichains. (6)

UNIT–II

4. a) Find the shortest distance from the vertex A to the vertex B in the graph shown below (The numbers associated with the edges are the distance between the vertices. (6)
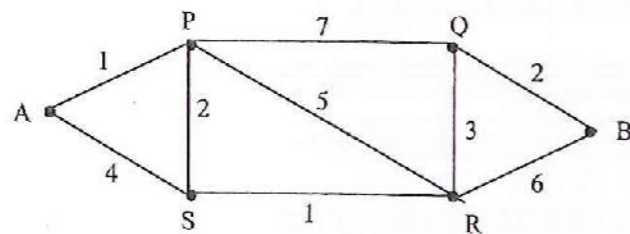
b) Show that there is always a Hamiltonian path in a directed complete graph. (6)

c) If in a graph with n vertices, there is a path from vertex v_1 to vertex v_2, then show that there is a path of not more than $n - 1$ edges from v_1 to v_2. (6)

5. a) Define Eulerian path. Show that an undirected graph possesses an Eulerian path if and only if it is connected and has either zero or two vertices of odd degree. (6)

b) For any connected planar graph, show that $v - e + r = 2$ where 'v' is the number of vertices, 'e' is the number of edges and 'r' is the number of regions of the graph. (6)

c) Define the terms: Path, Elementary circuit and Hamiltonian path. Illustrate with examples – one each. (6)

UNIT–III

6. a) Prove that the number of vertices is one more than the number of edges in a tree. (6)

b) Show that in a connected graph, every circuit has an even number of edges in common with every cutset. (6)

c) Construct a prefix code for the following alphabet, given the respective occurrences. (6)

Letter	:	a	b	c	d	e
No. of Occurrences	:	12	3	6	4	5

7. a) Describe a procedure to determine a minimum spanning tree of a connected weighted graph. (6)

b) In a graph G with respect to a given spanning tree let $D = \{e_1, e_2, ...e_k\}$ be a fundamental cutset in which e_1 is a branch and $e_2, e_3, ..., e_k$ are chords. Show that
   i) e_1 is contained in the fundamental circuits corresponding to e_i for $i = 2, 3, ...k$
   ii) e_1 is not contained in any other fundamental circuits (6)

c) Show that, a circuitless graph with v vertices and $v - 1$ edges is a tree. (6)

UNIT–IV

8. a) Show that the language $L = \left\{ a^k \mid k = i^2, i \geq 1 \right\}$ is not a finite state language. (9)

b) State the algorithm 'LARGEST2' for finding the largest of 'n' numbers. Also justify it with a formal proof. (9)

9. a) Define 'finite state language'. Show that $L = \left\{ a^k b^k \mid k \geq 1 \right\}$ is not a finite state language. (9)

b) State the algorithm BUBBLESORT for sorting the numbers $x_1, x_2, ...x_n$. Justify the algorithm with a formal proof. (9)

UNIT–V

10. a) If $a = \alpha_0 + \alpha_1 r + \alpha_2 r^2 + ... + \alpha_n r^n$. Show that a is $0(r^n)$. (6)

b) Compute a_7 given
$$3a_r - 5a_{r-1} + 2a_{r-2} = r^2 + 5, \quad a_3 = 3 \text{ and } a_4 = 6$$ (6)

c) Determine a particular solution for $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2 - 2r + 1$ (6)

P.T.O.

11. a) If $a_r = 5^r$, $r \geq 0$ and $b_r = 3^r$, $r \geq 0$ and $c = a*b$ determine c_r such that $c = a*b$ (6)

b) Obtain the numeric function a_r, corresponding to the generating function

$$A(z) = \frac{2+3z-6z^2}{1-2z}$$ (6)

c) Obtain the particular solution for the difference equation $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$. (6)

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

MATHEMATICS

PAPER VI: DISCRETE MATHEMATICS

Duration: 3 hours   Max Marks: 120

Note: 1. Answer any TEN questions in Part A. Each question carries 3 marks.
       2. Answer FIVE full questions from Part B choosing ONE full question from each unit.

PART A   3x10=30

1. a) If $A = \{p, q, r\}$ find $|P(A) \times A|$

b) Define chain. Give an example.

c) If $P(A) = 0.392$, $P(B) = 0.515$ and $P(A \cap B) = 0.090$. Find $P(A \cup B)$ and $P(^A|_B)$.

d) Write the number of branches and chords of the connected graph if it has 6 vertices and 12 edges.

e) Prove that the number of odd vertices in a graph is always even.

f) When are two graphs said to be isomorphic? Give one example.

g) Draw any 3 spanning trees of the following graph.
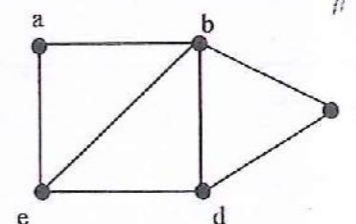
h) Prove that a connected graph always contains a spanning tree.

i) Obtain a binary tree for the prefix code { 1, 01, 000, 001 }

j) Prove that two states are in the same block in π_k if and only if they are in the same block in π_{k-1}

k) Analyse the time completely of the algorithm LARGEST1

l) Represent the model of 'modulo 3 sum counter' using the state diagram.

m) Find the particular solution of the difference equation $a_r = a_{r-1} + 7$.

n) Find the generating function for the numeric function $a_r = 7.3^r, r \geq 0$.

o) Find the backward difference for the numeric function $a_r = \begin{cases} 0, & 0 \leq r \leq 2 \\ 2^{-r} + 5 : r \geq 3 \end{cases}$

PART – B

UNIT–I

2. a) If A, B, C are any three finite sets, show that $(A - B) - C = A - (B \cup C)$ (6)

b) Prove that the set of all real numbers between 0 and 1 is uncountably infinite. (6)

PART - B

UNIT-I

2. a) Obtain the Euler formulas for the coefficients of the Fourier series of a function $f(x)$ with period T. (9)

   b) Show that $\beta(m, n) = \dfrac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ m, n > 0 (9)

3. a) Find the Fourier series of the function $f(x)$ given by.

   $f(x) = \begin{cases} -k, & -\pi < x < 0 \\ k, & 0 < x < \pi \end{cases}$ and $f(x+2\pi) = f(x)$ (6)

   b) Show that $\displaystyle\int_0^3 \dfrac{dx}{\sqrt{3x-x^2}} = \pi$ (6)

   c) Show that $\dfrac{\Gamma\left(\dfrac{1}{3}\right)\cdot\Gamma\left(\dfrac{5}{6}\right)}{\Gamma\left(\dfrac{2}{3}\right)} = \sqrt{\pi}\,2^{1/3}$ (6)

UNIT-II

4. a) Solve $\left(D^2+4\right)y = e^x + \cos 2x$ (6)

   b) Solve $\left(D^2 - 2D + 4\right)y = \sin x$ (6)

   c) Solve $\left(D^3 - D^2 - D + 1\right)y = 1 + x^2$ (6)

5. a) Solve $\left(D^2 - 2D + 1\right)y = e^{2x} + e^x$ (6)

   b) Solve $\left(D^3 + D^2 + D + 1\right)y = 2x^3 + 3x^2$ (6)

   c) Find a particular solution of $\left(D^2 - 9\right)y = 3e^x + x - \sin 4x$ (6)

UNIT-III

6. a) By the method of changing the independent variable, solve

   $\dfrac{d^2y}{dx^2} + \tan x\dfrac{dy}{dx} + y\cos^2 x = 0$ (6)

   b) Solve by the method of variation of parameters $\left(D^2 + 1\right)y = \sec x \tan x$ (6)

   c) Solve $x^2\dfrac{d^2y}{dx^2} - 3x\dfrac{dy}{dx} + 4y = x^2$ (6)

7. a) Solve $x^2\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} + 2y = x^2$. (6)

   b) By the method of changing the independent variable solve

   $(1+x^2)y_2 + xy_1 + 2y = 0$ (6)

   c) Solve by the method of reduction of order $y'' - y = e^x$ (6)

UNIT-IV

8. a) Find $L = \left\{ Q(t, c) \right\}$ where $Q(t, c) = \begin{cases} 1, & 0 < t < c \\ -1, & c < t < 2c \end{cases}$

   & $Q(t+2c, c) = Q(t, c)$ (6)

   b) Define the gamma function $\Gamma(x)$ and show that $L\{t^x\} = \dfrac{\Gamma(x+1)}{s^{x+1}}$ for $x > -1,\ s > 0$ (6)

   c) Find $L^{-1}\left\{\dfrac{s^2}{(s+1)^4}\right\}$ (6)

9. a) Derive the formula for the Laplace transform of a periodic function. (6)

   b) Express in terms of α – function and find the Laplace transform for the function

   $F(t) = \begin{cases} t^2, & 0 < t < 2 \\ 6, & t > 2 \end{cases}$ (6)

   c) Solve $x''(t) + 2x'(t) + x(t) = 3te^{-t},\ x(0) = 4,\ x'(0) = 2$ (6)

UNIT-V

10. a) A spring is such that a 4 pound weight stretches it by 0.64 feet. The 4 pound weight is pushed up $\dfrac{1}{3}$ foot above the point of equilibrium and then started with a downward velocity 5ft per sec. The motion takes place in a medium that furnishes a damping force of magnitude $\dfrac{1}{4}|v|$ at all times. Find the equation describing the position of the weight at time t. (9)

   b) Find D'Alembert's solution of one-dimensional wave equation. (9)

P.T.O.

11. a) A spring is such that a 2 pound weight stretches it by $\frac{1}{2}$ feet. An impressed force $\frac{1}{4}\sin 8t$ is acting upon the spring. If the 2 pound weight is released from a point 3 inches below the equilibrium point, determine the equation of motion. (9)

b) Solve the one dimensional heat equation. (9)

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER : 2017
MATHEMATICS
PAPER V: SPECIAL FUNCTIONS AND DIFFERENTIAL EQUATIONS

Duration: 3 hours   **Max Marks: 120**

Note: 1. **Answer any TEN questions in Part A. Each question carries 3 marks.**
     2. **Answer FIVE full questions from Part B choosing ONE full question from each unit.**

PART A   3x10=30

1. a) Write the Fourier series of even function $f(x)$ and write the formulas for a_0, a_n.

b) Show that for $x > 0, \Gamma(x+1) = x\Gamma(x)$

c) Evaluate $\int_0^1 x^4(1-x)^3 dx$

d) Find the complementary function of the differential equation $\left(D^2 - 8D + 9\right)y = \sin 5x$

e) Find the particular integral of the differential equation $\left(D^2 - 6D + 9\right)y = e^x$

f) Solve $\left(D^2 + 4\right)y = \cos 2x$

g) Transform $x^2 \dfrac{d^2 y}{dx^2} - 3x\dfrac{dy}{dx} + 4y = x^2$ into differential equation with constant coefficients using the substitution $z = \log x$.

h) Reduce $y_2 - 4xy_1 + (4x^2 - 3)y = e^{x^2}$ to normal form.

i) Find A in the method of variation of parameter to solve
$\left(D^2 + 1\right)y = \text{cosec} x \cot x$ if $y = A\cos x + B\sin x$

j) For positive integer n, prove that $L\{t^n\} = \dfrac{n!}{s^{n+1}}, s > 0$

k) Find $L\{\cos^2 kt\}$

l) Find $L^{-1}\left\{\dfrac{1}{s^2 + 2s + 5}\right\}$

m) A sping is such that it would be stretched 6-inches by a 12 pound weight. Find the spring constant.

n) Write the differential equation of motion when both damping and impressed forces are present.

o) Write the one dimensional (i) wave equation and (ii) heat equation

k) Find all permutation set of zeros in the following table of balanced assignment problem.

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 4 & 1 & 0 & 1 \\ 0 & 2 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

l) Convert the following unbalanced transportation problem into a balanced transportation problem.

3	2	1	30
2	5	9	75
40	30	50	

m) State maximal flow network problem.

n) Prove that any flow in a capacited directed network satisfies $\sum_j \phi(v_j) = 0$.

o) Define a source and sink in a capacitated directed network $N = [V, E]$.

PART - B

UNIT-I

2. a) Solve the following L.P.P. graphically: (9)
   Maximize $P(x, y) = 30x + 50y$
   subject to $\quad 2x + y \le 8$
   $\qquad\qquad x + 2y \le 10$
   $\qquad\qquad x, y \ge 0$

   b) Solve using the simplex algorithm: (9)

	x_1	x_2	-1	
	-1	-2	-3	$= -t_1$
	1	1	3	$= -t_2$
	1	1	2	$= -t_3$
	-2	4	0	$= f$

3. a) State the complete simplex algorithm for maximum table. (9)

   b) Solve using the simplex algorithm: (9)

	x	y	-1	
	-1	-1	-2	$= -t_1$
	1	-2	0	$= -t_2$
	2	1	1	$= -t_3$
	-1	3	0	$= f$

UNIT-II

4. a) Sole the following minimization LPP using the simplex algorithm. (9)

	-1	-1	-1
x	-1	-1	-1
y	-1	1	-1
-1	-2	1	0
	$= -t_1$	$= -t_2$	$= g$

b) Solve the noncanonical L.P.P.: (9)
   Maximize $f(x, y) = x + 3y$
   subject to $\qquad x + 2y \le 10$
   $\qquad\qquad -3x - y \le -15$

5. a) For any pair of feasible solutions of dual canonical L.P.P., prove that $g - f = SX' + Y'T$ (9)

   b) Solve the non canonical L.P.P. below (9)

   Maximize $f(x, y, z) = 2x + y - 2z$
   subject to $\qquad x + y + z \le 1$
   $\qquad\qquad y + 4z = 2$
   $\qquad\qquad x, y, z \ge 0$

UNIT-III

6. a) Solve the dual noncanonical L.P.P. (9)

	x_1	x_2	x_3	-1	
y_1	0	-1	-1	-1	$= -0$
y_2	-1	-3	4	0	$= -t_1$
y_3	-1	2	-3	0	$= t_2$
-1	-1	0	0	0	$= f$
	$= 0$	$= s_1$	$= s_2$	$= g$	

b) Solve the dual canonical LPP (9)

	x_1	x_2	-1	
y_1	-1	1	-1	$= -t_1$
y_2	1	-1	-1	$= -t_2$
-1	1	1	0	$= f$
	$= s_1$	$= s_2$	$= g$	

7. a) Solve the dual non canonical LPP (9)

	x_1	x_2	-1	
y_1	2	-1	-1	$= -0$
y_2	-1	1	-1	$= -t_1$
-1	2	1	0	$= f$
	$= 0$	$= s_2$	$= g$	

b) Find the optimal strategies for the row and column players and the Von Neumann value of the matrix game with pay off matrix $\begin{bmatrix} -5/3 & 0 \\ 5 & -10/3 \end{bmatrix}$ (9)

UNIT-IV

8. a) State the transportation algorithm. (9)

    b) Solve the assignment problem below. (9)

4	6	5	10
10	9	7	13
7	11	8	13
12	13	12	17

9. a) State the Hungarian algorithm to solve a balanced assignment problem. (9)

    b) Solve the transportation problem below. (9)

2	1	2	40
9	4	7	60
1	2	9	10

    50 60 30

UNIT-V

10. a) Show that in a capacitated directed network with unique fixed source and unique fixed sink, no edges into the source and no edges out of the sink, the value of the maximum flow is less than or equal to the minimal cut capacity. (9)

    b) Solve the shortest path network problem below. Also give the shortest path and the path value. (9)
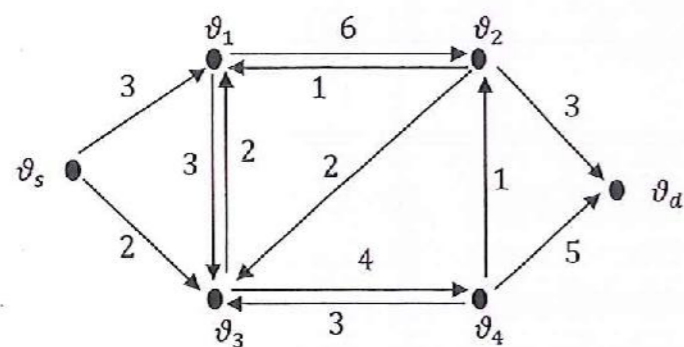
11. a) State the shortest path algorithm-I (9)

    b) Solve the maximal flow network problem below. Display the corresponding cut and cutset. (9)
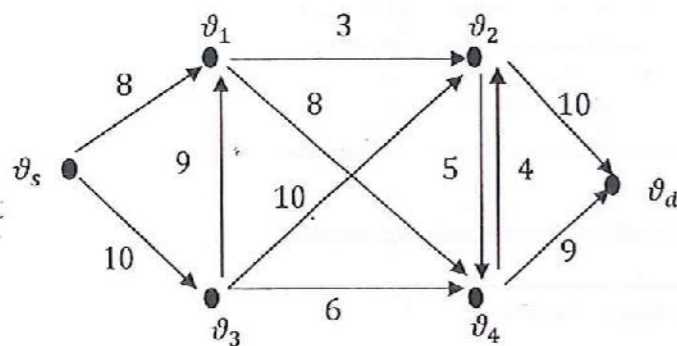
PART A   3x10=30

1. a) Define (i) a bounded set in R^n (ii) an extreme point of a convex set in R^n.

    b) Convert the following L.P.P. below to canonical form:

    Maximize $f(x, y) = x + y$

    subject to $\quad x - y \leq 3$

    $\qquad\qquad 2x + y \geq 1$

    $\qquad\qquad 0 \leq x \leq 4$

    $\qquad\qquad y \geq 0$

    c) Pivot on $a_{22} = 3$ in the following canonical maximum table

	x_1	x_2	-1	
	2	3	6	$= -t_1$
	1	3	2	$= -t_2$
	0	2	1	$= f$

    d) Given the L.P.P.:

    Maximize $f(x_1, x_2) = -2x_1 + x_2$

    subject to $\quad x_1 + x_2 \leq 2$

    $\qquad\qquad 2x_1 + x_2 \leq 6$

    $\qquad\qquad x_1, x_2 \geq 0$ State the dual canonical minimization LPP.

    e) Write the matrix reformulation of canonical maximization LPP.

    f) Write the negetive transpose of the following table:

x_1	1	3	6
x_2	2	4	5
-1	8	7	0
	$= -t_1$	$= -t_2$	$= g$

    g) Reduce the table of the matrix game.

2	1	4	2
1	-2	1	1
-1	6	3	-2
3	-3	5	1
1	-2	2	1

    using domination.

    h) Define mixed strategy and pure strategy for a row player of a matrix game.

    i) Let $A = (a_{ij})$ be a mxn matrix game. If the column player chooses pure strategy and row player uses mixed strategy $P = \begin{bmatrix} p_1 \\ p_2 \\ \vdots \\ p_n \end{bmatrix}$ then what is the expected value of row players winnings?.

    j) State the balanced assignment problem.

BOT 101.2   Reg. No. ....

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION
OCTOBER 2017
BOTANY
MICROBIAL DIVERSITY

Time: 3 Hrs   Max. Marks: 80

Instructions:
1. Answer both Part A & Part B.
2. Answer two full questions from each unit.
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer **any TEN** of the following.   10x2=20
   a) What are fimbriae? What is their significance?
   b) Who proposed five kingdom systems? Mention the kingdoms.
   c) Differentiate Phase contrast microscope and stereomicroscope.
   d) Give one living and non-living character of viruses.
   e) What is the use of iris diaphragm in a compound microscope?
   f) What are pleomorphic bacteria? Give one example.
   g) Mention any two common features of bacteria and cyanobacteria.
   h) What is a heterocyst? Mention its significance.
   i) What is cleistothecium? Name the genus in which it occurs.
   j) Define spawn and pinning.
   k) What is rhizomorph? In which group is it found?
   l) Differentiate *Peziza* apothecium from Lichen apothecium.

PART – B
UNIT – I

Answer **any TWO** of the following.   2x10=20

2. a) Describe the symptoms and control of Bunchy top disease of Banana and Tobacco mosaic virus disease.   6
   b) Differentiate lytic and lysogenic cycle.   4

3. a) Draw a neat labelled diagram of bacteriophage and explain.   6
   b) What are prions? Why are they important?   4

4. a) Describe the characteristics and disease caused by Mycoplasma.   6
   b) Explain Vein clearing disease.   4

UNIT – II

Answer any **TWO** of the following.   **2x10=20**

5. a) Draw a neat labelled diagram of a cyanophycean cell and add a note
        on salient features.   6

    b) Describe endospore structure of Bacteria and add a note on its
        significance.   4

6. a) Describe Genetic recombination process with reference to transduction. 6

    b) Write a short note on *Euglena*.   4

7. a) Describe the different methods of branching in *Scytonema*.   6

    b) Explain Ring Rot disease of Potato.   4

UNIT – III

Answer **any TWO** of the following.   **2x10=20**

8. a) Describe the process of sexual reproduction in *Rhizopus*.   6

    b) Explain economic importance of lichens.   4

9. a) Describe the life cycle of *Puccinia* on the primary host.   6

    b) Discuss the role of fungi as Biofertilizers.   4

10. a) Describe the thallus structure and explain the process of asexual reproduction
        in *Phytophthora*.   6

    b) Explain the different types of lichens with examples.   4

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BOT 301.2   Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION
OCTOBER 2017
BOTANY
PLANT DIVERSITY-II

Time: 3 Hrs   Max. Marks: 80

Instructions:
1. Answer both Part A & Part B.
2. Answer two full questions from each unit.
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer **any TEN** of the following.   10x2=20

   a) What is an offset? Give an example.

   b) Comment on the coralloid roots of *Cycas*.

   c) Give one example each for the following types of fruits.
       i) Syconus   ii) follicle   iii) Pepo   iv) Capsule.

   d) Explain the microspore of *Pinus*.

   e) What is a tetradynamous stamen? Give an example.

   f) Write any two important features of APG III system of classification.

   g) What are persistant and deciduous sepals?

   h) What is meant by pentamerous flower? Give one example.

   i) Draw a labelled diagram of a spikelet.

   j) Comment on the bracts and bracteoles of Acanthaceae.

   k) Differentiate the florets of Asteraceae.

   l) Write botanical names of any two economically important plants of Lamiaceae.

PART – B
UNIT – I

Answer **any TWO** of the following.   2x10=20

2. a) Give an account of different types of cymose inflorescences with suitable examples.   6

   b) Explain the *Gnetum* ovule with a suitable diagram.   4

3. a) Give an account of root modifications for storage with examples.   6

   b) What are phyllodes and phylloclades? Give one example each.   4

4. a) Describe the structure of male cone and microsporophyll of *Cycas*.   6

   b) What is phyllotaxy? Describe its types.   4

UNIT – II

Answer **any TWO** of the following. 2x10=20

5. a) Write the diagnostic characters of the family Anacardiaceae; give the botanical names of any two plants. 6

   b) What is aestivation? Explain any two types with examples. 4

6. a) What is placentation? Explain its types. 6

   b) Comment on the corolla of sub family Papilionoideae. Write the botanical names of any two economically important plants of the family. 4

7. a) Give the diagnostic characters of family Malvaceae. 6

   b) Explain the salient features, merits and demerits of Bentham and Hookers classification. 4

UNIT – III

Answer **any TWO** of the following. 2x10=20

8. a) Give an account of the diagnostic characters of Family Apocynaceae. 6

   b) Explain the inflorescence of Arecaceae. 4

9. a) Write a note on i) Leaves in Liliaceae. 6
      ii) Cyathium of Euphorbia

   b) Describe the Orchid flower. 4

10. a) Write short notes on. 6
    i) Interpetiolar Stipule.
    ii) Gynobasic style
    iii) Epigyny
    iv) Adnation
    v) jaculators
    vi) Caryopsis

    b) Write the common names and botanical names of any four economically important plants of Myrtaceae. 4

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BOT 501.2   Reg. No. ....

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION
OCTOBER 2017
BOTANY
PLANT PHYSIOLOGY

Time: 3 Hrs   Max. Marks: 80

Instructions:
1. Answer both Part A & Part B.
2. Answer two full questions from each unit.
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer **any TEN** of the following.   10x2=20
   a) List the differences between guttated water and transpired water.
   b) What are transferases? Give an example.
   c) Write any two important roles of nitrogen in plants.
   d) What are coenzymes? Give an example.
   e) Write a note on red drop and Emerson effect.
   f) What are the significances of cyclic photophosphorylation?
   g) Comment on Gibb's equation.
   h) Define translocation. Mention any two types.
   i) Give examples each for short day and long day plants.
   j) Define growth. Mention its phases.
   k) What is reductive amination? Give one example.
   l) What are the two components of a starch molecule?

PART – B
UNIT – I

Answer any **TWO** of the following.   2x10=20
2. a) Explain the Cohesion tension theory of ascent of sap.   6
   b) Write a note on factors affecting enzyme activity.   4

3. a) Explain the mechanism of stomatal movement by starch hydrolysis theory.
                                                                   6
   b) Write a note on deficiency symptoms of Phosphorus in Plants. 4

4. a) Write a note on i) Plasmolysis ii) Imbibition   6
   b) Differentiate between active and passive absorption of water 4

UNIT – II

Answer **any TWO** of the following.   2x10=20

5. a) Write notes on (i) Photosynthetic pigments and their composition
        (ii) Differentiate action and absorption spectra.   6

    b) Explain the pressure flow theory of translocation of organic solutes.   4

6. a) Give an account of ETS chain and its significance.   6

    b) List the industrial uses of fermentation.   4

7. a) Explain non cyclic photophosphorylation.   6

    b) Explain i) conversion of pyruvic acid to acetyl CoA.
            ii) Define RQ. Write its significance.   4

UNIT – III

Answer **any TWO** of the following.   2x10=20

8. a) Describe the synthesis of fats.   6

    b) Explain the role of ethylene in plants.   4

9. a) Write a note on (i) Photoinductive cycle and flowering.   6
                    (ii) Vernalization

    b) Explain the metabolism of sucrose.   4

10. a) Describe the mechanism of biological nitrogen fixation in plants.   6

    b) Explain the important roles of gibberellins in plants.   4

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BOT 502.2   Reg. No. ....

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION
OCTOBER 2017
BOTANY
MOLECULAR BIOLOGY

Time: 3 Hrs   Max. Marks: 80

Instructions:
1. Answer both Part A & Part B.
2. Answer two full questions from each unit.
3. All questions in Part B carry equal marks.
4. Draw diagrams wherever necessary.

PART – A

1. Answer any TEN of the following.   10x2=20
    a) Write the functions of t-RNA.
    b) Write the charactcristic features of Taq DNA polymerase.
    c) What is central dogma theory?
    d) Give the significance of triploidy in plants.
    c) What is BLAST?
    f) What are spontaneous mutations? Give example.
    g) What is a cistron?
    h) 'Genetic code is degenerate'. Comment on this.
    i) Define tetrasomy. Give an example.
    j) What are genome donors?
    k) What is deletion? Mention the types.
    l) What is autopolyploidy? Mention any two of its significance.

PART – B
UNIT – I

Answer any TWO of the following.   2x10=20

2. a) Explain the following stages of Translation in prokaryotes
            i) Elongation ii) Termination   6
    b) Explain the following: i) Pribnov box
                                  ii) Charagaff's base equivalence rule   4

3. a) Explain the steps of semiconservative method of replication.   6
    b) Write a note on post transcriptional modifications in mRNA.   4

4. a) Explain the following: i) Plasmid ii) RNA polymerase   6
    b) Write a brief note on r-RNA.   4

UNIT – II

Answer **any TWO** of the following.   **2x10=20**

5. a) Write a note on Tryptophan operon concept.   6

     b) Explain trisomy in plants with suitable examples.   4

6. a) Explain the cytological effects of Paracentric inversion.   6

     b) Write a note on the significance of Aneuploidy in plants.   4

7. a) Write a note on reciprocal translocation.   6

     b) Explain the synthesis of allotetraploid with an example.   4

UNIT – III

Answer **any TWO** of the following.   **2x10=20**

8. a) Give a detailed account on the types and effects of chemical mutagens.   6

     b) List out the applications of DNA fingerprinting technique.   4

9. a) Explain the steps involved in Poly Acrylamide Gel electrophoresis.   6

     b) Write note on Nucleotide sequence databases.   4

10. a) Write note on base-pair substitution.   6

     b) List out the applications of Human Genome Project.   4

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CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
MICROBIOLOGY
GENERAL MICROBIOLIGY

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I. Answer any <u>TEN</u> of the following: 2x10=20

   a) Indicator Media

   b) Binomial Nomenclature

   c) Stab Culture

   d) Felix De'Herelle

   e) UV Radiation

   f) Resolving Power

   g) Biogencsis

   h) Decolorizer

   i) Semi Solid Media

   j) Dairy Microbiology

   k) Pre Reduced Media

   l) Incineration

PART-B

Answer any TWO complete questions from each unit

UNIT-I

II. a) Discuss the contributions of Robert Koch to the development of
     Microbiology.   06

    b) Write a brief note on Whittaker's Five Kingdom concept.   04

III. a) Discuss the contributions of Louis Pasteur to the development of
     Microbiology.   06

    b) Discuss briefly on criteria used for classification of bacteria. 04

IV. a) Discuss the scope and significance of Microbiology as a modern science. 06

    b) Write a note on Edward Jenner.   04

UNIT-II

V.	a)	Discuss the principle and construction of dark field microscope.	06
	b)	Write a brief note on negative staining. -	04

VI.	a)	Discuss the parts, working principle and uses of Scanning Electron Microscope.	06
	b)	Write briefly on Aldehydes and metallic salts as chemical sterilants.	04

VII.	a)	Discuss filtration as a method of sterilization for liquids.	06
	b)	Write a brief note on Gram staining.	04

UNIT-III

VIII.	a)	Discuss briefly on serial dilution and pour plate method.	06
	b)	Write a note on characteristics of pure culture.	04

IX.	a)	Discuss the methods for preservation of pure culture.	06
	b)	Write a note on Anaerobic Jar.	04

X.	a)	Discuss the different types of special media.	06
	b)	Write a note on streak plate method.	04

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CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
MICROBIOLOGY
MICROBIAL GROWTH

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I. Answer any <u>TEN</u> of the following: 2x10=20

    a) Synthetases

    b) Amino Acids

    c) Exponential Phase

    d) Photolithotrophs

    e) Coenzymes

    f) Starch

    g) RNA

    h) Fragmentation

    i) Exoenzymes

    j) Buffer

    k) Acidophiles

    l) Lyases

PART-B

Answer any TWO complete questions from each unit

UNIT-I

II. a) Explain the growth curve of bacteria.   06

    b) Write a note on synchronous culture.   04

III. a) Classify bacteria according to their nutritional requirements.   06

    b) Write a note on Diffusion.   04

IV. a) Explain the methods of measurement of microbial growth by using

       cell number.   06

    b) Write a note on Chemostat.   04

UNIT-II

| V. | a) | Explain the different classes of Polysaccharides. | 06 |
| | b) | Write a note on protein denaturation. | 04 |

| VI. | a) | Explain the Watson and Crick model of DNA. | 06 |
| | b) | Write a note on fatty acids. | 04 |

| VII. | a) | Explain the primary and secondary structure of proteins. | 06 |
| | b) | Write a note on covalent bonds and hydrogen bonds. | 04 |

UNIT-III

| VIII. | a) | With a neat illustration, explain the lock and key model of enzyme action. | 06 |
| | b) | Write a note on pH sensitivity of enzymes. | 04 |

| IX. | a) | Explain the specificity of enzyme action. | 06 |
| | b) | Write a note on active site. | 04 |

| X. | a) | Explain the nomenclature and classification of enzymes. | 06 |
| | b) | Write a note on heat sensitivity of enzymes. | 04 |

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MIC 501.1   Reg. No. ....

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
MICROBIOLOGY
IMMUNOLOGY AND MEDICAL MICROBIOLOGY
Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I. Answer any TEN of the following: 2x10=20
    a) Antibiotics
    b) Oral Thrush
    c) Lymphokines
    d) AZT
    e) Antibody
    f) AIDS
    g) Allergens
    h) Antiparasitic Drugs
    i) Typhoid.
    j) Serology
    k) Griseofulvin
    l) Signet Ring

PART-B
UNIT-I
Answer any TWO complete questions of the following: 10x2=20

II. a) Explain the mechanism of Cell Mediated Immune Response.   06
     b) Write a note on the measurement of Antigen and Antibody.   04

III. a) Discuss the classification of Hypersensitivity reactions.   06
     b) Write a note on Acquired Immunity.   04

IV. a) Explain the Agglutination Reactions. Add a note on its Applications. 06
     b) Write a note on the Applications of Monoclonal Antibodies.   04

UNIT-II
Answer any TWO complete questions of the following: 10x2=20

V.   a) Explain the pathogenesis, Lab diagnosis and treatment of *Neisseria gonorrhoeae.*
                                                                      06
     b) Write a note on *Trichomonas.*   04

VI. a) Explain the lab diagnosis and Pathogenesis of *Hepatitis A*   06
     b) Write a note on Shigellosis.   04

VII. a) Explain the pathogenesis, lab diagnosis and treatment of *Streptococcus.* 06
     b) Write a note *Pseudomonas.*   04

UNIT-III
Answer any TWO complete questions of the following: 10x2=20

VIII. a) Discuss the Assay of Antibiotics.   06
      b) Write a note on Principles of Chemotherapy.   04

IX. a) Briefly explain about Penicillin.   06
     b) Write a note on development of Antibiotic Resistance.   04

X.   a) Briefly explain about Streptomycin.   06
     b) Write a note on the factors affecting Microbial control.   04

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

MICROBIOLOGY

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I.   Answer any <u>TEN</u> of the following: 2x10=20

    a)   IMViC Test
    b)   Xenobiotics
    c)   Histoplasmosis
    d)   Septic Tank
    e)   Blister of Tea
    f)   Sieve Device
    g)   Rhizosphere
    h)   Sedimenatation
    i)   Thermal Precipitation
    j)   Soil Actinomycetes
    k)   Anaerobic Digester
    l)   Burkard Spore Trap

PART-B

Answer any TWO complete questions from each unit

UNIT-I

II.	a)	Discuss the factors affecting Microbes in stored water.	06
	b)	Write a note on Trickling Filters.	04
III.	a)	Discuss the MPN test for coliforms.	06
	b)	Write a note on Membrane Filter Technique.	04
IV.	a)	Discuss the mechanism of Biogas Production.	06
	b)	Write a note on Slow Sand Filters.	04

UNIT-II

V.	a)	Discuss the different methods of enumeration of microorganisms in air using solid media.	06
	b)	Write a brief note on Vertical Cylinder Spore Trap.	04
VI.	a)	Explain the different Bacterial Air Borne Diseases.	06
	b)	Write a note on Measles and Small Pox.	04
VII.	a)	Discuss the method of liquid impingement.	06
	b)	Write a note on Coccidiomycosis and Paracoccidiomycosis.	04

UNIT-III

VIII.	a)	Define Bioleaching. Explain types of Microbial leaching with examples.	06
	b)	Write a note on Tikka Disease of Groundnut.	04
IX.	a)	Discuss the production of Rhizobium Biofertilizer.	06
	b)	Write a note on Decomposition of Lignin.	04
X.	a)	Discuss the role of Secondary Metabolites in disease development.	06
	b)	Write a brief note on positive type of interactions among soil microbes.	04

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CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

ZOOLOGY
ZOOMORPHOLOGY - I

Duration: 3 hours   Max Marks: 80

Note: Answer any TEN Questions from Part-A
Answer SIX questions from Part-B choosing any two questions from each unit.

PART A

I.   Answer any <u>TEN</u> of the following: 10x2=20

1.   Define Hotspot. Name the hotspots of India.

2.   Name the different stages in the life cycle of Entamoeba histolytica.

3.   What is spongocoel?

4.   Write any two distinguishing characters of Scyphozoa with two examples.

5.   Give the scientific name of liverfluke and tapeworm.

6.   Draw a neat labelled diagram of scolex of tapeworm.

7.   To which class does leech belong? Mention its scientific name.

8.   What are flame cells? Mention their functions.

9.   Write a note on biramous appendage.

10.   What is Pest Management? Mention the different types.

11.   What is mantle?

12.   What is madreporite?

PART-B
UNIT-I

II.   a)   Define biodiversity. Explain the levels of biodiversity.   07

      b)   Write a note on medusa.   03

III. a)   Give an account of life cycle of Plasmodium vivax in man with diagram.   07

      b)   Write a short note on Holozoic nutrition in protozoans.   03

IV.   a)   Write explanatory notes on Diplodal canal system in sponges.   07

      b)   Explain polymorphism with reference to Physalia.   05

UNIT-II

V. a) With a neat labelled diagram explain the external characteristics of Ascaris. Add a note on its pathogenicity. 07

   b) Explain the tubicolous adaptations exhibited by Arenicola. 03

VI. a) Give an account of the general characters of the phylum Annelida with any two examples. 07

   b) Write a note on Scolex in tapeworm. 03

VII. a) Give an account of pathogenicity of Filarial worm. 05

   b) Write six distinctive characters of class Oligochaeta with two examples. 05

UNIT-III

VIII. a) Classify Phylum Mallusca upto classes giving two diagnostic characters with one example of each. 07

   b) With a neat labelled diagram explain petasma in Penaeus. 03

IX. a) Describe water-vascular system in sea-star. 07

   b) Draw a neat labelled diagram of Unio. 03

X. a) With a neat labelled diagram explain mouthparts of mosquito. 05

   b) Write any six distinguishing features of class Crinoidea with two examples. 05

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ZOO 301.2   Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017

ZOOLOGY
PHYSIOLOGY, BIOCHEMISTRY AND IMMUNOLOGY
Duration: 3 hours   Max Marks: 80

Note: Answer any TEN Questions from Part-A
Answer SIX questions from Part-B choosing any two questions from each unit.

PART A

I.   Answer any <u>TEN</u> of the following: 10x2=20

1.   What is Neurophysiology?

2.   What is echolocation? Name any two animals which exhibit echolocation

3.   What are respiratory pigments? What is the prosthetic group of haemoglobin and haemoerythrin.

4.   What is counter current mechanism?

5.   Enumerate the components of blood.

6.   Name any four hormones controlling digestion.

7.   Name the proteins found in skeletal muscles.

8.   What are multipolar neurons? Give an example.

9.   Mention any two biological significances of lipids.

10. What are coenzymes? Give two examples.

11. What is tocopherol? Mention its function.

12. Name the primary lymphoid organs.

PART-B
UNIT-I

II. a) Define osmoregulation. Differentiate osmoregulation in marine and fresh water teleosts.   07
     b) Write a note on tubular secretion.   03

III. a) Explain the physiology of transport of carbon dioxide by blood.   07
     b) What are osmo-conformers and osmo- regulators? Give examples.   03

IV. a) With graphical representation, explain oxygen-haemoglobin dissociation curve.
                                                                     05
     b) With respect to humans, explain ornithine cycle.   05

UNIT-II

V. a) With reference to muscle contraction, explain the sliding filament theory. 07
    b) Write a short note on foetal circulation.   03

VI. a) Explain carbohydrate digestion in man. Add a note on its absorption.   07
    b) Write a note on conduction system of human heart.   03

VII. a) Define action potential. Explain the characteristics of a neuron during action
        potential.   05
     b) Draw a neat labeled diagram of human eye.   05

UNIT-III

VIII. a) What are the functions and deficiency disorders of vitamin A?   07
      b) Explain briefly competitive inhibition.   03

IX. a) Give an account of structure and function of IgG.   07
     b) Write a brief note on Payer's Patch.   03

X.   a) Give an account of factors affecting antigenicity.   05
     b) Explain Conjugated proteins.   05

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CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
ZOOLOGY
CELL BIOLOGY, MOLECULAR BIOLOGY, GENETIC ENGINEERING
Duration: 3 hours   Max Marks: 80

Note: Answer any TEN Questions from Part-A
Answer SIX questions from Part-B choosing any two questions from each unit.

PART A

I.   Answer any <u>TEN</u> of the following: 10x2=20

1.   Write two functions of lysosomes?

2.   What is euchromatin?

3.   Mention any two enzymes associated with plasma membrane.

4.   Write any functions of microfilaments.

5.   What is cell differentiation?

6.   What is a cell cycle?

7.   What is a bivalent? How is it formed?

8.   What is malignant neoplasm?

9.   Name the nucleotides of DNA.

10. Define the term, splicing.

11. What is transduction?

12. Mention any two characteristics of genetic code.

PART-B

UNIT-I

II.   a)   What are giant chromosomes? Give an account of the structure and functions of lamp brush chromosomes?   07
      b)   Write a note on Na^+-K^+ pump.   03

III. a)   With a suitable illustration, describe the fluid mosaic model of plasma membrane.   07
      b)   Write a short note on sub divisions of Cell Biology.   03

IV.   a)   Write a note on Karyotyping.   05
      b)   Explain the structural organization of microtubules.   05

UNIT-II

V.	a)	Give an account of chemical carcinogens.	07
	b)	Draw a neat labeled diagram of Anaphase I of Meiosis.	03

VI.	a)	With suitable illustrations, explain the different stages of Mitosis.	07
	b)	Write a note on Oncogenic viruses.	03

VII.	a)	Explain nucelo- cytoplasmic enteractions in Acetabularia.	05
	b)	Enumerate the events of mitotic interphase..	05

UNIT-III

VIII.	a)	Give an account of DNA replication.	07
	b)	Draw a labeled diagrammatic representation of initiation complex during protein synthesis.	03

IX.	a)	Explain the various stages of PCR technique.	07
	b)	Write short note on Wobble hypothesis	03

X.	a)	Enumerate the forms of DNA with their distinctive features.	05
	b)	What is molecular cloning? Explain the process with reference to recombinant DNA techonology.	05

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ZOO 502.2   Reg. No. ....

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
ZOOLOGY
DEVELOPMENTAL BIOLOGY
Duration: 3 hours   Max Marks: 80

Note: Answer any TEN Questions from Part-A
Answer SIX questions from Part-B choosing any two questions from each unit.

PART A

I.   Answer any TEN of the following: 10x2=20

1.   Who is the father of embryology? What are his contributions.

2.   What is the role of vas deference in reproduction?

3.   Name the phases the gonial cells have to undergo.

4.   What is surrogate mother?

5.   What is capacitation of sperm?

6.   Define Megalecithal egg with an example.

7.   Define embryonic induction.

8.   Mention the different morphogenic movement in the development of frog.

9.   What is the type of cleavage in chick?

10. Draw a neat labeled diagram of yolk sac placenta.

11. What is implantation? When does it happen?

12. Name the hormones of the pituitary.

PART-B

UNIT-I

II. a) With the help of a neat labeled diagram, explain the female reproductive system
         in humans.   07
     b) Give an account of historical review of embryology.   03

III. a) Explain Arrhenotoky and Thelytoky giving suitable examples.   07

     b) Explain the changes taking place in nucleus and cytoplasm during
         spermiogenesis.   03

IV. a) Explain the steps involved in cloning of Dolly the sheep.   05

     b) Explain briefly estrous cycle.   05

UNIT-II

V. a) With the help of labeled sketches describe the process of fertilization.   07
   b) What is grey crescent? Mention its significance.   03

VI. a) Explain the different types of cleavage based on amount and distribution of yolk.   07
   b) Enumerate the significance of fertilization.   03

VII. a) Draw a neat labelled diagram of yolk plug stage of gastrula of frog.   05
   b) Explain the theories of organizer.   05

UNIT-III

VIII. a) Draw a labelled diagram of hen's egg and explain the structure.   07
      Draw a labelled diagram of human Placenta.   03

IX. a) Discuss the role of hormones in development with reference to gonadotropins.   07
   b) Write explanatory note on syndesmochorial placenta.   03

X. a) Write explanatory note on i) Ammion ii) Chorion   05
   b) Explain the structure of 24 hours chick embryo with a labelled diagram.   05

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COS 101.1   Reg. No. ....

CREDIT BASED FIRST SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
COMPUTER SCIENCE
PAPER I – FUNDAMENTALS OF DIGITAL ELECTRONICS

Time: 3 Hrs.   Max. Marks: 80
                          PART – A

1. Answer any TEN questions from the following: 10×2=20

   a) Convert $(AF)_{16}$ in to decimal and octal.

   b) Write the 1's complement of decimal 22.

   c) State the difference between canonical form and standard form.

   d) Write the complement of the functions $F = \bar{x}\bar{y} + \bar{x}\bar{y}z$.

   e) Define half adder and also write its truth table.

   f) What is BCD? Write the BCD equivalent of decimal 12.

   g) Write the difference between combinational and sequential circuits.

   h) Write the Excess – 3 code for decimal digits 0 to 9.

   i) What are edge triggered flip flops? Name the two types.

   j) Write the difference between asynchronous and synchronous counters.

   k) What are registers? Write its use.

   l) What is scratchpad memory?

                          PART – B
Answer any TWO questions from each unit.

                          UNIT – I

2. a) Convert i) $(243.5)_{10}$ to binary

                ii) $(11010101.101)_2$ to decimal

                iii) $(FF.FF)_{16}$ to octal

   b) Perform the following subtraction using 1's complement and 2's complement methods.
      $1110101_{(2)} - 1101010_{(2)}$ (6+4)

3. a) Express the Boolean function $F = A + \bar{B}C$ in product of maxterms form.

   b) Using K-map simplify the following expression:
      $F(A, B, C, D) = \sum(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ (4+6)

4. a) Write the truth table and logic circuit of the expression: $F(x, y, z) = \bar{x}y + \bar{x}z$

   b) Using K-map simplify the following expression: $F(A, B, C) = \sum(0, 2, 3, 4, 6)$ and
      implement using basic gates.   (4+6)

UNIT – II

5. a) What is a full adder? Explain its working with a neat logic diagram and truth table.

   b) Implement $F(a, b, c) = \sum(1, 3, 5, 6)$ using 4×1 line MUX.   (6+4)

6. a) Explain the working of magnitude comparator with a neat diagram.

   b) With a neat diagram explain the working of BCD adder.   (5+5)

7. a) What is a multiplexer? Explain the working of 4×1 line MUX with a neat diagram.

   b) With a neat diagram and truth table explain the working of 3 to 8 line decoder circuit. (5+5)

UNIT – III

8. a) Explain the JK flip flop with logic diagram and characteristic table.

   b) Write the excitation tables of RS Flip Flop, JK FF & TFF.   (5+5)

9. a) With a neat diagram, explain the working of Bidirectional shift register with parallel load.

   b) Design a 3 bit Binary Ripple counter and explain its working.   (5+5)

10. a) Write a note on accumulator register.

   b) Explain the different flags to status register present in the ALU.   (5+5)

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COS 301.1   Reg. No. ....

CREDIT BASED THIRD SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
COMPUTER SCIENCE
PAPER III – DBMS AND DATA STRUCTURES USING C

Time: 3 Hrs.   Max. Marks: 80
                              PART – A

1. Answer any TEN questions from the following: 10×2=20

    a) What is DBMS? Give two examples.

    b) Define the super key of a relation.

    c) Differentiate single valued and multi valued attribute.

    d) Define the terms   i) entity   ii) weak entity

    e) Give the characteristics of Relational Data Model.

    f) Give the general form of INSERT statement.

    g) Differentiate DROP TABLE and DELETE statements.

    h) Explain BETWEEN predicate with syntax.

    i) Differentiate primitive and non-primitive data structures.

    j) What is LIFO data structure? Give example.

    k) What is circular list?

    l) Define the terms strictly binary tree and depth of a tree.

                              PART – B
Answer any TWO questions from each unit.

                              UNIT – I
2. a) Explain any three advantages of database systems over file oriented systems.

    b) What is DBA? Explain the functions of DBA.   (6+4)

3. a) Explain 3 schema architecture of DBMS.

    b) What is Data Independence? Explain physical and logical data Independence.   (6+4)

4. a) Explain Entity integrity, referential integrity and domain constraints.

    b) Explain self join and theta join operations with examples.   (6+4)

                              UNIT – II
5. a) Explain different data types in Oracle.

    b) The database file contains following information about suppliers and ports.
        SUPPLIER (SNO, SNAME, STATUS, CITY)
        PARTS (PNO, PNAME, QTY_ON_HAND, UNIT_PRICE)
        ORDER (ORDER_NO, SNO, PNO, QTY_SUPPLIED
        ORDER_DATE, SUPP_DATE)

Give SQL Queries for the following:
i) List all suppliers having 'r' as third character in their name.
ii) Get details of suppliers who have not supplied any parts.
iii) Get supplier no and total quantity of each part they have supplied.
iv) List the supply date of "floppy drive". (4+6)

6. a) What is data constraint? Explain how to specify primary key and foreign key constraint for a table with example.

   b) Explain the 3 types of alter table statements with syntax and example. (4+6)

7. a) Explain following predicates/functions/clauses syntax and example.

   i) COUNT(*)   ii) REVOKE   iii) LIKE

   b) Explain 'GROUP BY' & 'HAVING' clause with syntax and example. (6+4)

UNIT – III

8. a) What is queue? Give the algorithms for insert and remove operations of the queue.

   b) Write the algorithms for deleting a node from the beginning and appending a node at the end of the single linked list. (5+5)

9. a) What is doubly linked list? Give the algorithms to traverse a doubly linked list in forward direction.

   b) Write an algorithm to create a circular list. (5+5)

10. a) Give the algorithm to insert a node to the binary search tree.

    b) Consider preorder and in order traversals of binary tree.
    PREORDER: ABDECFG
    INORDER: DBEAFGC
    Construct binary tree and write the post order traversal. (6+4)

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Reg. No..................................

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
COMPUTER SCIENCE – V
VISUAL PROGRAMMING USING VB.NET

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. **Answer any TEN questions from the following:**   **10×2=20**
    a) What does VBIDE stands for?

    b) Mention the different logical operators of VB.NET.

    c) What is an array? How do you declare arrays in VB.NET?

    d) Write the use of Val( ) & Str( ) functions with example.

    e) Distinguish between group box and panel.

    f) List any four properties of a list box.

    g) Mention the use of controlbox property of a form.

    h) Write the difference between functions and procedures in VB.NET.

    i) Mention any two important properties of a data control.

    j) What is a dataset?

    k) Write the use of data provider.

    l) What is the purpose of connection class?

PART – B
Answer any Two questions from each unit:

UNIT – I

2. a) Write a note on features of VB.NET.
    b) Explain the following:
        i)   Solution Explorer Window
        ii) Properties Window   **[5 + 5]**

3. a) Explain any four objects of tool box in VBIDE.
    b) Explain different forms of If statements with syntax and example.   **[4 + 6]**

4. a) Explain any five string functions with example.
    b) Explain For....Next and For each...Next looping statements with example.   **[5 + 5]**

UNIT – II

5. a) Explain any four methods of a form.
    b) Explain the following text selection properties with example.
        i)   SelectionStart   ii) SelectedText
        iii) SelectionLength   **[4 + 6]**

6. a) Explain InputBox( ) and MsgBox( ) functions with example.
    b) Explain multiline, scrollbar, wordwrap and maxlength properties of a textbox.   **[6 + 4]**

7. a) Define the following:
i) Class ii) Object iii) Constructor iv) Abstract class
v) Inheritance
b) Explain any five methods of a list box. [5 + 5]

UNIT – III

8. a) Explain the advantages of ADO.NET.
b) What is an exception? Explain the types of exception handling. [5 + 5]

9. a) Write a note on simple and complex binding.
b) Explain try catch finally blocks with example. [5 + 5]

10. a) Explain any two methods of connection class and any two methods of dataadapter class.
b) Write a code to create, retrieve and update a data table. [4 + 6]

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COS 502.3

CREDIT BASED FIFTH SEMESTER B.Sc. DEGREE EXAMINATION OCTOBER 2017
COMPUTER SCIENCE – VI
Operating System & Linux

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. **Answer any TEN questions from the following:**   10×2=20
    a) Define operating system.
    b) Write any two advantages of multi threading program.
    c) What is command interpreter?
    d) Explain any one criteria for process scheduling.
    e) Mention any four types of files.
    f) Differentiate between pre-emptive and non pre-emptive scheduling.
    g) Define context switching.
    h) What is swapping?
    i) Mention different shells of Linux Operating System.
    j) How do you copy file from one location to another location, in Linux? Give example.
    k) How do you redirect the output of one command to another? Give example.
    l) List the string operators in Linux with example.

PART – B

Answer any Two questions from each unit:

UNIT – I

2. a) Explain the different operating systems services.
    b) What is process control block? Explain its structure.   [6 + 4]

3. a) Differentiate between Internal and External fragmentation.
    b) Write a note on real time operating system.   [6 + 4]

4. a) Explain shortest job first and Round Robin process scheduling and compare them.
    b) Write a note on segmentation.   [6 + 4]

UNIT – II

5. a) What is deadlock? Explain any one method of deadlock detection with the help of an example.
    b) Explain different types of directory structure.   [6 + 4]

6. a) What are the necessary conditions for deadlock to occur? Explain.
    b) Write a note on Disk Caching.   [6 + 4]

7. a) How do you improve the performance of disk system? Explain any two methods.
    b) Explain any two methods of deadlock avoidance.   [6 + 4]

UNIT – III

8. a) Explain the following Linux Commands with the help of examples.
    i) grep   ii) sort   iii) wc
    b) Write a note on 'chmod' command   [6 + 4]

9. a) Write the general file structure of Linux.
    b) Write a shell program to generate Fibonacci series up to a given limit.   [6 + 4]

10. a) Explain any two looping constructs in Linux with example.
    b) Write any four features of Linux Operating System.   [6 + 4]

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