18CHE 201   Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
CHEMISTRY
PAPER II: GENERAL CHEMISTRY

Duration: 3 hours   Max marks: 80

Note: 1. Write question numbers and subdivisions clearly.
      2. Write chemical equations and diagrams wherever necessary.

PART A

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

    a) What color is imparted to the flame by following metals?
        i) Na   ii) K

    b) Name the bleaching agents used to remove the colour of pulp.

    c) Arrange the following hydrides in the increasing order of the ionic character.
        KH, LiH, CSH, RbH, NaH

    d) What is the importance of plasticizer in paint?

    e) State law of mass action.

    f) What is a second order reaction? Give an example.

    g) Give any two criteria for designing a green synthesis.

    h) The rate constant for a second order reaction is 3.33×10^{-2} dm^3/mol/sec. If the
        initial concentration of the reactant is 0.05 mol/dm^3 Calculate the half life
        period of the reaction.

    i) What are electrophiles? Give an example.

    j) Cresols are weaker acids than phenol. Give reason.

    k) Give any two applications of glycerol.

    l) What is Claisen rearrangement reaction?

PART-B
UNIT-I

Answer any <u>TWO</u> of the following.   10x2=20

2. a) Compare the diagonal relationship between Li and Mg.   04
    b) Explain the variation of basic character of S block elements down   03
        the group in the periodic table.
    c) How is white lead manufactured by Dutch process.   03

3. a) How is NaOH prepared by membrane process.   03
    b) Explain the role of calcium in the biosystem.   03
    c) Write the chemical reactions involved in the setting of cement.   04

4. a) Describe the manufacture of Na$_2$CO$_3$ by Solvay process   04
    b) Compare the complexation tendencies of alkali and alkaline earth metals. 03
    c) Lithium is a good reducing agent in aqueous solution. Why?   03

UNIT-II

Answer any __TWO__ of the following.   10x2=20

5. a) Describe Clapeyron – Clausius equation   04
    b) How is order of a reaction determined by half life method   03
    c) Explain the green synthesis of acetaldehyde   03

6. a) Derive an expression for the rate constant of a second order reaction, when   04
        the initial concentration of the reactants are the same.
    b) What is atom economy? Explain with an example.   03
    c) The equilibrium contant K_p for the reaction is 5.63 at 298K. Calculate the   03
        standard free energy change for the reaction. (R= 8.314 J/K/mole)

7. a) Derive Van't – Hoff's equation of energy.   04
    b) How is the mechanism of decomposition of nitrogen pentoxide determined?   03
    c) A second order reaction with initial concentration of reactants is 75%   03
        complete in 45 min. Calculate the velocity constant of the reaction.

UNIT-III

Answer any __TWO__ of the following.   10x2=20

8. a) How is glycerol manufactured from spent lye?   04
    b) Give the mechanism of Gattermann reaction.   03
    c) What is Markownikoff's rule? Give a reaction following this rule.   03

9. a) Explain the mechanism of Fries rearrangement reaction.   04
    b) How is ethylene glycol manufactured?   03
    c) Explain the orientation of – CH_3 group in toluene.   03

10. a) Explain the mechanism of reaction between alcoholic KOH and t – butyl   04
        bromide.
    b) Describe the method of manufacture of methanol from water gas.   03
    c) Write the structure of dynamite, vanillin and eugenol.   03

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18PHY201   Reg No.............................
CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
PHYSICS
PAPER II: MECHANICS AND THERMAL PHYSICS
Duration: 3 Hours   Max Marks: 80
PART –A
1. (A) Answer any <u>TWELVE</u> of the following.   12X1=10

    i)   Write the relation between torque and angular acceleration for a rigid body.

    ii)   What is the physical significance of moment of inertia?

    iii) State parallel axis theorem of moment of inertia.

    iv) What is the condition for minimum period for a compound pendulum?

    v)   What is a torsion pendulum?

    vi) What is the advantage of a multistage stage rocket?

    vii) Define inelastic collision.

    viii) Give an example for central force.

    ix) What is an artificial satellite?

    x)   How does the period of a loaded spring change as the mass suspended from it varies?

    xi) What happens to the temperature during an adiabatic change?

    xii) What is reversible process?

    xiii) Give Kelvin statement of second law of thermodynamics.

    xiv) How does melting point of wax vary with temperature?

    xv) How does the entropy change during irreversible process?

PART-B
UNIT-I
Answer any TWO from the following: 2 X 8 = 16

2. (a) Obtain an expression for kinetic energy of rotation of a rigid body.

   (b) Deduce the expression for the moment of inertia of a thin rod about an axis passing through its ends and perpendicular to the rod. Hence derive the expression for moment of inertia of the rod about an axis, passing through its centre and perpendicular to the rod.   (2+6)

3. (a) Prove the theorem of perpendicular axes of moment of inertia.

   (b) Derive the formula for moment of inertia and rotational energy of a diatomic molecule.   (2+6)

4. (a) Write a short note on Kater's pendulum.

   (b) Define centre of suspension and centre of oscillation. Show that there are four collinear points with the centre of gravity about which the period of oscillation is same.   (2+6)

UNIT-II
Answer any <u>TWO</u> of the following.   2 X 8 = 16

5. (a) What are the conditions to obtain a higher value of the rocket velocity?

   (b) Derive differential equation for a SHM and hence obtain expression for displacement of particle executing SHM.   (2+6)

6. (a) Show that when angular momentum is conserved, motion is planar.

(b) Define elastic and inelastic collision. Derive the expression for the velocities of two particles after a head-on collision between them. **(2+6)**

7. (a) Derive the relation between gravitational field and potential energy.

(b) State the law of conservation of energy. Derive an expression for the period of vertical oscillations of a loaded spring. **(2+6)**

UNIT-III

Answer any TWO of the following. **2 X 8 = 16**

8. (a) What is the physical significance of first law of thermodynamics?

(b) What is temperature-entropy diagram? Derive an expression for the efficiency of a Carnot's engine using T-S diagram. **(2+6)**

9. (a) Show that change in entropy in a Carnot's cycle is zero.

(b) Derive the relation between pressure, volume and temperature for an ideal gas undergoing adiabatic change. **(2+6)**

10. (a) Explain briefly BCS theory of superconductivity.

(b) Describe the process for production of low temperature by adiabatic demagnetization. **(2+6)**

PART-C

Answer any FOUR of the following. **4 X 5 = 20**

11. A 1.5 kg mass is rotated in a circle at the end of a string 0.5 m long. If the mass makes 120 revolutions per minute, what is the angular momentum? If the rate of momentum is 0.2π $rad\,s^{-2}$, what is the torque acting on it?

12. A thin uniform bar of length 120 cm is made to oscillate about an axis through its end. Find the period of oscillation and other points about which it can oscillate with the same period.

13. A 2 kg weight stretches a spring by 0.04 m. The 2 kg weight is removed and 0.49 kg is suspended from the spring. Find the period of oscillation of the spring. $(g = 9.8\,m\,s^{-2})$

14. A rocket, set for vertical firing weighs 50 kg and contains 450 kg of fuel. It can have a maximum exhaust velocity of 2 $km\,s^{-1}$. What should be its minimum rate of fuel consumption, (i) to just lift it off the launching pad? (ii) to give it an acceleration of 20 ms^{-2}?

15. A certain volume of air at 30°C expands adiabatically until its volume is doubled. Find the resulting temperature and the work done. $(\gamma = 1.4)$

16. Calculate the depression in the melting point of ice for an increase of pressure of 2 atmospheres. Specific volume of ice and water at 0°C are $1.091 X 10^{-3}\,m^3\,kg^{-1}$ and $1X 10^{-3}\,m^3 kg^{-1}$ respectively. Latent heat of ice is $336 X 10^3\,J\,kg^{-1}\,k^{-1}$. One atmosphere = $10^5\,Nm^{-2}$

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18BOT 201   Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
BOTANY
Paper II 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) Write any 2 differences between Zygomycetes and Ascomycetes
    b) What is soredia? Where is it found?
    c) Mention the stages of *Puccinia* on wheat plant?
    d) Write any two symptom of 'Blast disease of Rice'?
    e) What are pegged rhizoids? Where is it found?
    f) Define Apospory? Give an example.
    g) What is gradate sorus? Name the plant in which it occurs?
    h) Define Protoslele. Mention any 2 types of it.
    i) What are Perichaetial leaves? Where is it found?
    j) Write any 2 economic importances of Pteridophytes?
    k) Mention any 4 types of fossils?

PART – B
UNIT – I

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

2. a) Draw a neat labeled diagram of V.S of *Peziza* apothecium and explain the structure 6
    b) Describe Teluetosorus stage of *Puccinia*   4

3. a) Describe the morphological types of Lichens with one example each. Add a note on their
       economic importance.   6
    b) Write the symptoms, etiology and management of Koleroga of Arecanut.   4

4. a) Explain the role of fungi in Medicine and Agriculture   6
    b) Write a brief note on Mushroom Cultivation   4

UNIT – II

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

5. a) Explain the structure of sporophyte of *Anthoceros*.   6
    b) Describe the primitive features of *Rhynia*.   4

6. a) Explain the structure of Capsule of *Funaria* with a labeled sketch. 6
    b) Explain the structure of *Riccia* Sporophyte   4

7. a) Write an account of stellar types in Pteridophytes   6
    b) Explain the internal structure of Synangium of *Psilotum*   4

UNIT – III

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

8. a) Describe the anatomy of *Equisetum* stem   6
    b) Explain the reproductive structure of *Osmunda*   4

9. a) Explain the structure of T.S. of fertile leaflet of *Pteris*   6
    b) Describe the sporophyte of *Ophioglossum*   4

10. a) Describe the structure of H.L.S of sporocarp of *Marsilea*   6
    b) List out the techniques involved in fossil study   4

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CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
COMPUTER SCIENCE
Digital Electronics and Operating System.

Time: 3 Hrs   Max. Marks: 80

PART – A

1. Answer any TEN questions from the following: 2x10=20

a. Write the truth table of the full adder.

b. Differentiate between Encoder and Decoder.

c. What is a D-flip flop? Why it is called so?

d. What is a toggling in J K flip flop?

e. List any two types of operating system.

f. Expand GUI and IPC

g. Define Thread.

h. What do you mean by Segmentation?

i. List the different thread models.

j. Define deadlock.

k. List any two basic Linux commands.

l. Differentiate between mv and cp commands in Linux.

PART – B

Answer any TWO questions from each unit.   (5+5)

UNIT – I

2. a) What is half subtractor? Explain with a logic diagram and truth table.

   b) Implement BCD to excess 3 code converter.

3. a) What is a decoder? Explain the working of 3 – bit decoder with a diagram.   (5+5)

   b) Draw the block diagram of binary parallel adder and explain its working.

4. a) Design a counter to count the binary sequence 2,4,6,8,10,12   (6+4)
       and repeat using T flip flops.

   b) Write a note on triggering of Flip flops.

18MAT201   Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019

MATHEMATICS
PAPER II: CONIC SECTIONS, SPECIAL FUNCTIONS, FOURIER SERIES, DIFFERENTIAL EQUATIONS AND NUMBER 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.

<div align="center">

PART A   3x10=30

</div>

1.   a)   Find an equation of the parabola whose focus is at $(0, -3)$ and its directrix is the line $y = 3$.

     b)   Find foci, centre and vertices of the ellipse $2x^2 + 3y^2 = 18$.

     c)   Determine the conic $4x^2 + 4xy + y^2 - 6x + 12y = 0$ using discriminant test.

     d)   Show that $\Gamma(n+1) = n\Gamma(n)$

     e)   Evaluate $\int\limits_0^1 x^4(1-x)^3 \, dx$

     f)   Derive an expression for Fourier coefficient a_0 of the function $f(x)$ of period 2π.

     g)   Check the exactness of $(y^2 - 2xy + 6x)dx - (x^2 - 2xy + 2)dy = 0$

     h)   Find the integrating factor for $\dfrac{dy}{dx} = 1 + 3y \tan x$.

     i)   Find the orthogonal trajectories of the family of curves $x - 4y = c$.

     j)   Find the general solution and singular solution of $y = px + p^3$

     k)   Find the p-discriminant equation of $p^2 - xp - y = 0$

     l)   Solve $x^2p^2 - y^2 = 0$

     m)   Prove that the square of any odd integer is of the form $8k + 1$.

     n)   If $a = bq + r$, then prove that $g.c.d(a,b) = g.c.d(b,r)$.

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

PART - B

UNIT-I

2. a) Derive an equation of the ellipse in the standard form. (9)

   b) Find the centre, foci, vertices and asymptotes of the conic $x^2 - y^2 + 8x - 2y - 21 = 0$. (9)

3. a) Derive the relation $x = \bar{x}\cos\alpha - \bar{y}\sin\alpha, y = \bar{x}\sin\alpha + \bar{y}\cos\alpha$ between the old co-ordinates (x, y) and the new co-ordinates $(\bar{x}, \bar{y})$ for the rotation by an angle α of the co-ordinate axes. (9)

   b) Find the vertex, the focus, an equation of the axis and the equation of the directrix of the parabola $x^2 + 6x + 4y + 8 = 0$. (9)

UNIT-II

4. a) i) Show that $\int_0^1 x^{3/2}(1-x)^{-1/2}dx = \dfrac{63}{256}\pi$ (9)

   ii) Evaluate $\int_0^{\pi/2} \cos^6\theta d\theta$.

   b) Find Fourier coefficients of the periodic function. (9)

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

5. a) Evaluate i) $\int_0^2 \dfrac{x^2}{\sqrt{2-x}}dx$ ii) $\dfrac{\Gamma(3)\,\Gamma(3/2)}{\Gamma(9/2)}$ (9)

   b) Find the Fourier coefficients of the periodic function. (9)

   $$f(t) = \begin{cases} 0 & -2 < t < -1 \\ k & -1 < t < 1 \\ 0 & 1 < t < 2 \end{cases} \quad and \quad f(t+4) = f(t)$$

UNIT-III

6. a) Solve $y(6y^2 - x - 1)\,dx + 2x\,dy = 0$ (6)

   b) Solve $3x^2 y\,dx + (y^4 - x^3)\,dy = 0$. (6)

   c) Find the Orthogonal trajectories of the family of curves given by $r = a(1 + \sin\theta)$ (6)

7. a) Solve $(2xy - 3x^2)\,dx + (x^2 + y)\,dy = 0$ (6)

   b) Solve $(x + 2y - 4)\,dx - (2x + y - 5)\,dy = 0$ (6)

   c) Solve $(1 + 3x \sin y)dx - x^2 \cos y\,dy = 0$ (6)

UNIT-IV

8. a) Solve $xyp^2 + (x + y)p + 1 = 0$ (6)

   b) Find the p-discriminant and solutions contained in the p-discriminant of the equation $xp^2 - 2yp + xp = 0$ (6)

   c) Solve $y'' = x(y')^3$. (6)

9. a) Find the general solutions and singular solution of $xp^2 - 3yp + 9x^2 = 0$ (6)

   b) Solve $(x^2 - 1)\,p^2 - 2xyp + y^2 - 1 = 0$ (6)

   c) Solve $yy'' + (y')^2 + 1 = 0$ (6)

UNIT-V

10. a) Given integers a and b not both of which are zeros, prove that there exist integers x, y such that $g.c.d\ (a,b) = ax + by$ (9)

    b) Solve the Linear Diophantine Equation (9)
       $172x + 20y = 1000$

11. a) Given integers a and b with b>0, prove that there exist unique integers q, r such that $a = qb + r, \quad 0 \le r < b$ (9)

    b) i) Find the g.c.d of 119 and 272 and express it in the form $119x + 272y$. (5)
       ii) If $a|bc,\ g.c.d(a,b) = 1$ then prove that $a|c$ (4)

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18MIC201

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019

MICROBIOLOGY- II

GENERAL MICROBIOLOGY

Max Marks: 80

Duration: 3 Hours

Note: Draw diagrams wherever necessary.

PART A   10x2=20

I.   Answer any <u>TEN</u> of the following:
   a) Pili
   b) Prosthecae
   c) Prophage
   d) Penicillium
   e) Chlamydospore
   f) Capsid
   g) Mesosome
   h) Filariasis
   i) PPLO
   j) Flagella of Bacteria
   k) Rabies virus
   l) Trophozoite of Entamoeba histolytica

PART-B

UNIT-I

Answer any TWO complete questions of the following: 2x10=20

II. a) Explain in detail about the cytoplasmic organelles in bacteria.   06
     b) Write a note on Archaebacteria.   04

III. a) Explain in detail about the bacterial cell wall.   06
     b) Write a note on Protoplast and Spheroplast.   04

IV. a) Write a neat labelled diagram explain the structures of Bacterial Endospore. 06
     b) Write a note on capsule and slime layer.   04

UNIT-II

Answer any TWO complete questions of the following: 2x10=20

V.   a) Discuss the general characters and cell structure of Mycoplasma.   06
     b) Write a short note on reproductive cycle of Chlamydia.   04

VI. a) Explain the lytic cycle of viruses.   06
     b) Write a note on economic importance of Actinomycetes.   04

VII. a) Discuss the classification of viruses.   06
     b) Write a note on economic importance of Rickettsia.   04

UNIT-III

Answer any TWO complete questions of the following: 2x10=20

VIII. a) Explain in detail about Aspergillus.   06
      b) Write a note on Oscillatoria   04

IX. a) Explain the sexual cycle of Plasmodium vivax.   06
     b) Write a note on Rhizopus.   04

X.   a) Discuss the Morphology and life cycle of Balantidium coli.   06
     b) Write a note on Nostoc.   04

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18STA201   Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
STATISTICS
PAPER II –DISTRIBUTION THEORY

Time: 3 Hrs   Max. Marks: 80

PART – A

Answer any TEN of the following: 10X2=20

1. a) Find the mean and variance of Bernoulli variate.

    b) State any two examples for Binominal variate.

    c) State the additive property of independent Poisson variates.

    d) Derive the mean of Geometric distribution.

    e) Write the p.m.f of Negative Binominal variate.

    f) Define Hypergeometric distribution. Give an example in which it occurs.

    g) What is the relation between Geometric distribution and Negative Binomial distribution?

    h) State the mean and variance of the distribution $U(0,\theta)$

    i) Derive the mean of Gamma distribution.

    j) The mode of chi square distribution is 6. What are its mean and variance?

    k) State central limit theorem.

    l) Define convergence in probability.

PART – B

Answer any TWO of the following: 10x2=20

2. a) Derive the mean and variance of Binomial distribution.

    b) Derive the mode of Poisson distribution.   (5+5)

3. a) Derive the mean and variance of Hypergeometric distribution

    b) State and prove memory less property of Geometric distribution.   (5+5)

4. a) Stating the assumptions show that Poisson distribution is a limiting case of Binominal distribution.

    b) Derive the recurrence relation for central moments of the Poisson distribution.   (5+5)

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

5. a) Derive an expression for even order central moments of Normal distribution.

     b) Find the MGF of an Exponential distribution and hence find mean & variance.   **(5+5)**

6. a) Derive mean and variance of Beta distribution of second kind.

     b) Obtain the MGF of Gamma distribution with parameters α and λ.   **(6+4)**

7. a) Obtain an expression for median of Cauchy distribution.
     b) Derive mean deviation from mean for Normal distribution.   **(5+5)**

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

8. a) If X and Y are independent Gamma variates with parameters m and n respectively, show that $U = x + y$ and $Z = \frac{x}{y}$ are independent and U is a Gamma Variate with parameter $(m+n)$ and Z is a $\beta_2(m,n)$ variate.

     b) If X has a uniform distribution $(0,1)$ find the distribution of $-2\log X$.   **(6+4)**

9. a) Find the mean and variance of t-distribution with n degrees of freedom.
     b) Find the mode of Chi-Square variate with $n\ d.f$ **(5+5)**

10. a) Derive the density function of F distribution..
     b) Derive an expression for central moments of t distribution.   **(5+5)**

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18ZOO201   Reg. No. ....

CREDIT BASED SECOND SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
ZOOLOGY
ZOOMORPHOLOGY - II

Duration: 3 hours   **Max marks: 60**

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 any two external features of Herdmania.
   2.   Name any two subphyla of chordata with an example for each.
   3.   Write any two external features of Petromyzon.
   4.   What are Chondrichthyes? Give an example.
   5.   What do you mean by Amphibian? Give any 2 examples.
   6.   What is Urostyle? Where is is found?
   7.   Define poikilothermy with an example.
   8.   Define fang. Mention the types.
   9.   Give any 4 examples for Superorder Palaeognathae.
   10. What is Synsacrum?
   11. List any 2 types of dentition in mammals.
   12. Give two examples for order Perissodactyla.

PART-B
UNIT-I

II.   a)   Describe the external features of Balanoglossus.   07
      b)   List any six features of Class Cyclostomata.   03

III. a)   Describe the external features of Amphioxus.   07
      b)   Draw a neat labeled diagram of Ammocetus larva.   03

IV.   a)   Describe the external features of ROHU   05
      b)   Write a note on fins of Shark   05

UNIT-II

V.   a)   Describe the structure of digestive system of frog.   07
      b)   Write a note on pectoral girdle of frog.   03

| VI. | a) | Enumarate the general characters of class Reptilia. | 07 |
| | b) | Write a note on hyoid apparatus in frog. | 03 |

VII.		Write a note on	
	a)	Python and Ptyas.	05
	b)	Give a brief account of order crocodilia.	05

UNIT-III

| VIII. | a) | Write General Characters of Neornithes with any two examples. | 07 |
| | b) | Name the flight muscles in bird and mention their function. | 03 |

| IX. | a) | Discuss the affinifies of Prototheria | 07 |
| | b) | Explain the types of gaits found in mammals. | 03 |

| X. | a) | Enumerate any eight distinctive characteristics of Aves with any two examples. | 05 |
| | b) | Describe male urinogenital system of rat. | 05 |

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18EC0201

Reg. No. ....

CREDIT BASED SECOND SEMESTER B.A. DEGREE EXAMINATION
APRIL 2019
Macro Economics

Time: 3 Hrs.

Max. Marks: 120

I. Answer any TWO of the following:

24×2=48

ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಎರಡು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿರಿ.

1. What is National Income. What are the methods of estimating National Income?
ರಾಷ್ಟ್ರೀಯ ಆದಾಯವನ್ನು ಎಂದರೇನು? ರಾಷ್ಟ್ರೀಯ ಆದಾಯವನ್ನು ಮಾಪನ ಮಾಡುವ ವಿಧಾನಗಳು ಯಾವುವು?

2. Explain Keynesian Theory of Employment.
ಕೇನ್ಸರವರ ಉದ್ಯೋಗ ಸಿದ್ಧಾಂತವನ್ನು ವಿವರಿಸಿ.

3. Explain the concept of consumption function. What are the factors determining it?
ಅನುಭೋಗ ಕ್ರಿಯೆ ಪರಿಕಲ್ಪನೆಯನ್ನು ವಿವರಿಸಿ. ಅದನ್ನು ನಿರ್ಧರಿಸುವ ಅಂಶಗಳು ಯಾವುವು?

4. Explain Ricrado's theory of Rent. What are its limitation?
ರಿಕಾರ್ಡೋನ ಗೇಣಿ ಸಿದ್ಧಾಂತವನ್ನು ವಿವರಿಸಿ. ಅದರ ಮಿತಿಗಳಾವುವು?

II. Answer any FOUR of the following:

12×4=48

ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ.

5. What are the causes of income inequalities? Explain the measures for reducing Inequalities.
ಆದಾಯ ಅಸಮಾನತೆಯ ಕಾರಣಗಳು ಯಾವುವು? ಅಸಮಾನತೆಯನ್ನು ಕಡಿಮೆಗೊಳಿಸುವ ಕ್ರಮಗಳನ್ನು ವಿವರಿಸಿ.

6. Explain the classical theory of Employment.
ಸಾಂಪ್ರದಾಯಿಕ ಉದ್ಯೋಗ ಸಿದ್ಧಾಂತವನ್ನು ವಿವರಿಸಿರಿ.

7. What is investment junction? Explain the factors determining it?
ಹೂಡಿಕೆಯ ಕ್ರಿಯೆ ಎಂದರೇನು? ಅದನ್ನು ನಿರ್ಣಯಿಸುವ ಅಂಶಗಳನ್ನು ವಿವರಿಸಿರಿ.

8. Analyse the loanable Funds Theory of interest.
ಸಾಲನಿಧಿ ಬಡ್ಡಿ ಸಿದ್ಧಾಂತವನ್ನು ವಿಶ್ಲೇಷಿಸಿ.

9. Explain the phases of business cycle.
ಆರ್ಥಿಕ ಆವರ್ತದ ಹಂತಗಳನ್ನು ವಿವರಿಸಿ.

10. Explain the difficulties involved in measuring national income.
ರಾಷ್ಟ್ರೀಯ ಆದಾಯವನ್ನು ಮಾಪನ ಮಾಡುವಲ್ಲಿ ಎದುರಾಗುವ ಸಮಸ್ಯೆಗಳನ್ನು ವಿವರಿಸಿ.

III. Answer any Four of the following:

6×4=24

ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ.

11. Define Macro Economics. Explain the uses of Macro Economics.
ಸಮಗ್ರ ಅರ್ಥಶಾಸ್ತ್ರವನ್ನು ವ್ಯಾಖ್ಯಾನಿಸಿ. ಸಮಗ್ರ ಅರ್ಥಶಾಸ್ತ್ರದ ಉಪಯೋಗಗಳನ್ನು ವಿವರಿಸಿ.

12. What is 'quasi rent'?
'ಆರೆಗೇಣಿ' ಎಂದರೇನು?

13. Write a short note on ' Multiplier'
ಗುಣಕದ ಬಗ್ಗೆ ಲಘು ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ.

Page | 1

14. Write a note on ' Innovation Theory of Profit'
    ಆವಿಷ್ಕಾರ ಲಾಭ ಸಿದ್ಧಾಂತದ ಬಗ್ಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ.

15. What are the monetary methods of controlling Business Cycles.
    ಆರ್ಥಿಕ ಆವರ್ತಗಳನ್ನು ನಿಯಂತ್ರಿಸುವ ವಿತ್ತೀಯ ಕ್ರಮೆಗಳಾವುವು?

16. Write a short note on risk theory of Profit.
    ಗಂಡಾಂತರ ಸಿದ್ಧಾಂತದ ಬಗ್ಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ.

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CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
CHEMISTRY
PAPER IV: GENERAL CHEMISTRY

Duration: 3 hours   Max Marks: 80

Note: 1. Write question numbers and subdivisions clearly.
         2. Write chemical equations and diagrams wherever necessary.

PART A

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

    a) Zn^{2+} and Ti^{4+} ions are colourless why?

    b)   Draw the structure of the complex with coordination number 6

    c)   Give the electronic configuration of O_2 molecule.

    d)   State the hybridization and geometry in BeF_2.

    e)   Write Freundlich adsorption isotherm equation & explain the terms.

    f)   Write any 2 applications of adsorption phenomenon.

    g)   State Raoult's law of liquid mixtures.

    h)   What is an ageotropic mixture? Give an example.

    i)   Give the relative basicity of primary, seconday & tertiary amines.

    j)   What happens when benzenediazonium chloride is treated with Phenol.

    k)   What is Zeigler – Natta catalyst?

    l)   What is Vulcanization of rubber?

PART-B
UNIT-I

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

2. a)   Compare the 4d & 5d series of elements with their 3d analogues in   04
        respect of ionic radii, oxidation states and magnetic property.
   b)   Give any three limitations of valence bond theory?   03
   c)   Calculate the magnetic moment of Cr^{3+} ion using spin only formula.   03

3. a)   Explain the structure and geometry of PF_5 04
   b)   Give reason why transition metals form complex compounds readily?   03
   c)   What are the conditions for the formation of molecular orbitals by LCAO?   03

4. a)   Draw the molecular orbital energy level diagram for N_2 molecule. Calculate bond
        order and explain the magnetic property.   04
   b)   Explain why transition metals show variable oxidation states   03
   c)   Give any three differences between VBT & MOT.   03

UNIT-II

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

5. a)   Explain the determination of surface are of an adsorbent using

		B.E.T. Equation.	04
	b)	Explain the fractional distillation of non ideal solution of Type II	03
	c)	Write a note on nicotine – water systesm.	03

6.	a)	Deduce Langmuir adsorption isotherm equation.	04
	b)	State and illustrate Nernst distribution law.	03
	c)	A mixture of water and an organic compound steam distilled. under 101.3kpa at 371.4K. The distillate contains 45.2% of organic compound by mass. The vapour pressure water at 371.4K is 95.7kpa. Calculate the molecular mass of the organic compound.	03

7.	a)	Explain the factors that affect adsorption by solids from solutions.	04
	b)	When benzoic acid was shaken with mixture of benzene & water at 298K & 101.3Kpa, the following results were obtained. Concentration of acid in benzene 0.24 0.55 0.93 Concentration of acid in water 0.015 0.022 0.029 Show that bezoic acid is associated into double molecule in bezene layer.	03
	c)	Write short note on surface films	03

UNIT-III

Answer any TWO of the following.   2x10=20

8.	a)	Explain Hoffmann method of separation of a mixture of primary, secondary and tertiary amines	04
	b)	Write the preparation and application of Bakelite.	03
	c)	How is Neoprene manufactured?	03

9.	a)	Explain the mechanism of cationic vinyl polymerization	04
	b)	Explain the reactions of amines with nitrous acid	03
	c)	Explain carbylamine reaction with an example.	03

10.	a)	How is epoxy resin manufactured and give two applications	04
	b)	What are the monomers of a) natural rubber b) Buna N c) Nylon - 6	03
	c)	Give example for i) Sandmeyer reaction	03
		ii) Gomberg – Bachmann reaction.	

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PHY 401.2

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
PHYSICS
Paper IV: Electromagnetism and Electricity

Duration: 3 Hrs. Max. Marks: 80

PART – A

1. A. Answer any TEN of the following: 10×1=10
   i) Define gradient of a scalar function.
   ii) Define curl of a vector function.
   iii) Write the differential form of Gauss' law.
   iv) What is normal dispersion?
   v) State Kirchoff's Voltage law.
   vi) What is meant by linear circuit?
   vii) Define half time constant of a CR circuit.
   viii) Give the expression for frequency of oscillation of a LCR circuit.
   ix) Define capacitive reactance.
   x) What is the filter circuit?
   xi) Give the expression for line current in delta configuration.
   xii) What are eddy currents?

   B. Answer any FIVE of the following: 5×2=10
   i) What are scalar and vector fields? Give one example for each.
   ii) Define Poynting Vector and explain its significance.
   iii) How do you convert a voltage source into a current source?
   iv) In a CR current when change grows exponentially, the current decreases exponentially. Explain.
   v) Define mean value and rms value of alternating current.
   vi) Mention any two facture causing damping of the BG coil.

PART – B
## UNIT – I

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

2. a) Deduce Maxwell's field equation $\vec{\nabla} \times \vec{E} = \dfrac{-\partial \vec{B}}{\partial t}$ with usual symbols.
   b) Prove that the vector $\vec{A} = 3\,y^2\,z\,\hat{\imath} + 4\,x^3\,z^2\,\hat{\jmath} + 3\,x\,y\,\hat{k}$ is a solenoid. (6+4)

3. a) Deduce Maxwell's field equation $\vec{\nabla}.\vec{E} = {}^{-\rho}/_E$ with usual symbols.

   b) If $\vec{A} = \dfrac{\vec{r}}{r}$ find grad div $\vec{A}$. (6+4)

4. a) Derive the wave equation for the field vector E and B. Hence arrive at the equation for the velocity of electro-magnetic waves in a medium.
   b) For non sinusoidal wave, suppose $E = 100\ Vm^{-1}$, find the value of B, the energy density and the rate of energy flow per unit area. $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2N^{-1}m^{-2}$ $C = 3 \times 10^8\ ms^{-1}$, $\mu_0 = 4\,\pi \times 10^{-7}$ (6+4)

UNIT – II

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

5.   a)   With a general network explain the steps involved in finding the branch currents using mesh current method.

      b)   Obtain the Thevenin equivalent circuit for the network given below and also calculate the current through the load resistance.
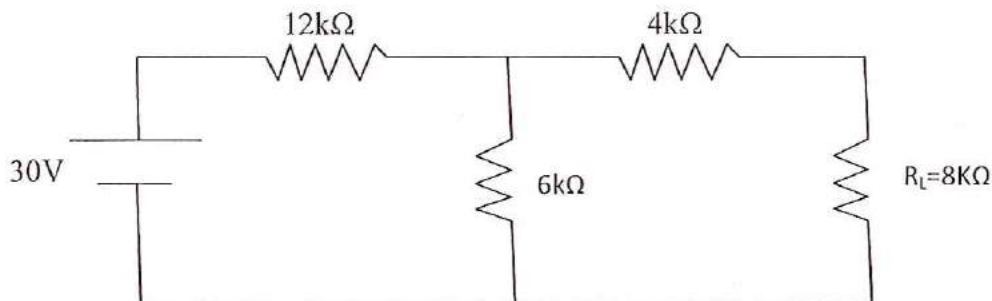
                                                                (6+4)

6.   a)   Derive an expression for the growth of current in a LR circuit and define time constant.

      b)   A capacitor charged by a D.C sources through a resistance of 2 MΩ tables 0.5sec to ¾ of its final value. Find the capacitance of the capacitor.   **(6+4)**

7.   a)   Obtain an expression for the change on the capacitor when it is discharged through series LCR circuits.

      b)   A circuit has an inductance 10 MH, capacitance 0.1 μ.F and resistance 1000 ohms. Is the circuit oscillatory? If so, find the frequency of oscillation.   **(6+4)**

UNIT – III

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

8.   a)   Draw the series LCR circuit and obtain the expression for current in a series LCR circuit. Give phase relationship between current and voltage.

      b)   Find the current and calculate power when a voltage $V = 283e^{j\,100\,\pi\,t}$ is applied to a coil having R = 50 Ω and L = 0.159 H.   **(6+4)**

9.   a)   What is a high pass filter? Explain how a CR circuit can be used as a high pass filter and obtain the expression for cut-off frequency.

      b)   A balanced star-connected load of (8+j6) Ω per phase is connected to a three phase 230V supply find the line current, power factor and power.   **(6+4)**

10.   a)   Give the theory of Anderson's bridge.

      b)   A capacitor of capacitance 1000 pF is charged to a potential difference of 1V and discharged through B.G. The first throw on a scale placed 1m away is 62.2 cm. If time period of the B.G. coil is 10 s; logarithmic decreament is 0.02. Calculate the change sensitivity and current sensitivity of B.G.   **(6+4)**

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BOT 401.2   Reg. No. ....

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION   APRIL 2019
BOTANY
Paper IV CELL BIOLOGY, GENETICS, ANATOMY AND EMBRYOLOGY

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) Mention any two types of plastids with one function each.
    b) What are raphides? Give their composition.
    c) Mention any two functions of Golgi bodies.
    d) Give the components of a Nucleosome.
    e) State Mendel's second law.
    f) What is a test cross? Mention its significance.
    g) What are histogens? Mention the types.
    h) What are Sclereids? Mention the types.
    i) Define an annual ring and dendrochronology.
    j) What are the adaptations for ornithophily in a plant?
    k) Define Chalazogamy and mesogamy.
    l) Mention the methods of pollen viability test.

PART – B

UNIT – I

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

2. a) Describe the fluid Mosaic model to explain the ultrastructure of Plasma membrane
                                                                6
    b) What are Lysosomes? Explain the different types.   4

3. a) Describe the structure of a typical Metaphasic Chromosome.   6
    b) Explain Zygotene and Pachytene with labelled diagrams.   4

4. a) Explain incomplete linkage with a plant example.   6
    b) Differentiate between i) simple pits and bordered pits ii) SER and RER.   4

UNIT – II

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

5. a)   Describe polygenic inheritance with a plant example.   6

     b)   Classify the meristems based on its position.   4

6. a)   Describe complementary gene interaction.   6

     b)   Write a note on xylem elements.   .4

7. a)   Give an account of Parenchyma tissue.   6

     b)   Explain Law of purity of gametes with an example.   4

UNIT – III

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

8. a)   Describe the structure of Monocot stem with a labelled diagram.   6

     b)   Draw a neat labelled diagram of anatropous ovule and explain.   4

9. a)   Explain the types of contrivances for cross pollination.   6

     b)   Describe the structure of mature anther.   4

10. a)   Explain the different types of endosperm.   6

      b)   Write a note on lenticels and mention its significance.   4

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COS401.1

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
COMPUTER SCIENCE
Paper IV – Java Programming and Object oriented Programming Concepts

Time: 3 Hrs   Max. Marks: 80

PART – A

1. Answer any TEN questions from the following: 2x10=20

a) What is data encapsulation ?

b) Define multithreading.

c) What are Java tokens?

d) Write the Syntax & example for Conditional Operator?

e) Define Class.

f) What is the purpose of wrapper class?

g) What is an interface? How does it differ from a class?

h) When do we declare member of a class as static?

i) Write any two methods to block a thread?

j) Write any two built – in exceptions in Java.

k) What is Java Virtual Machine?

l) What do you mean by remote applet?

PART – B
Answer any TWO full questions from each unit.

UNIT – I

2. a) Explain any four types of Java Statements.   (4+6)

   b) Write a note on assignment and logical operators in Java.

3. a) Explain any five features of Java   (5+5)

   b) Explain simple if and if ....else statements with examples

4. a) Explain the structure of Java Program with an example.   (4+6)

   b) Explain while loop and do while loop with an example each.

UNIT – II

5. a) Explain single inheritance with an example. **(4+6)**

   b) What is a package? How package is created in Java? Explain with an example.

6. a) What do you mean by method overloading? Give an Example. **(5+5)**

   b) Explain any five string methods with examples.

7. a) How do you declare and initialize one – dimensional array? Give Example. **(5+5)**

   b) With an example explain different types of constructors supported in Java.

UNIT - III

8. a) Explain the life cycle of a thread. **(6+4)**

   b) What is a finally block? When and how it is used? Give an example.

9. a) Explain how applets differ from java application programs. **(5+5)**

   b) Write a note on thread priorities.

10. a) Write a short note on exception handling mechanism in Java. **(5+5)**

    b) Explain the life cycle of an applet.

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MAT 401.2   Reg. No. ....

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
MATHEMATICS
PAPER IV: ANALYTICAL GEOMETRY, RING THEORY AND COMPLEX VARIABLES
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 an equation of the graph of $x^2 - y^2 = 8$ with respect to $\bar{x}$ and $\bar{y}$ axes after a rotation
          of axes through an angle of radian measures $\dfrac{\pi}{4}$.

   b) Find the eccentricity of the conic $r = \dfrac{5}{2+\sin\theta}$ and identify the conic.

   c) A parabola has its focus at the pole and its vertex at $\left(4, \dfrac{3\pi}{2}\right)$. Find a polar equation of
       the parabola.

   d) Let $J\left(\sqrt{2}\right) = \left\{m + n\sqrt{2} : m \text{ and } n \text{ are int egers}\right\}$. Prove that $\phi : J\left(\sqrt{2}\right) \to J\left(\sqrt{2}\right)$ defined
       by $\phi(m+n\sqrt{2}) = m - n\sqrt{2}$ is a homomorphism of rings.

   e) If every element x in a ring R satisfies $x^2 = x$, prove that R is commutative.

   f) If U is an ideal of R and $1 \in U$, then prove that $U = R$.

   g) Prove that a Euclidean ring possesses a unit element.

   h) Find all the units in $J[i]$

   i) Prove that $x^2 + 1$ is irreducible over F, the field of integers modulo 7.

   j) Sketch the set $|2z+3| > 4$

   k) Write the function $f(z) = z^3 + z + 1$ in the form $f(z) = u(x,y) + iv(x,y)$

   l) If $f(z) = z^2$. Find $f'(z)$ using definition of derivatives.

   m) Show that $f(z) = (3x+y) + i(3y-x)$ is an entire function.

   n) Evaluate $\displaystyle\int_0^1 (1+it^2)\, dt$

   o) Evaluate $\displaystyle\int_C (z-1)\, dz$ where C is the arc from z=0 to z=2 consisting of the segment
       $0 \le x \le 2$ of the real axis.

PART - B

UNIT-I

2. a) If $B \neq 0$ then prove that the equation $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ can be
        transformed into the equation $\overline{A}\overline{x}^2 + \overline{C}\overline{y}^2 + \overline{D}\overline{x} + \overline{E}\overline{y} + \overline{F} = 0$. When $\overline{A}$ and $\overline{C}$ are not
        both zero, by a rotation of axes through an angle α for which $\cot 2\alpha = \dfrac{A-C}{B}$ (6)

    b) Simplify the equation $17x^2 - 12xy + 8y^2 - 80 = 0$ by a rotation of axes. Draw a sketch of
        the graph of the equation and show both sets of axes.   (6)

    c) i) Find a Polar equation of the hyper bola having a focus at the pole and the
           corresponding directrix to the left of the focus if the point $(2, \dfrac{4\pi}{3})$ is on the hyperbola
           and $e = 3$
        ii) Write an equation of the directrix that corresponds to the focus at the pole.   (6)

3. a) Remove the xy term from the equation $24xy - 7y^2 + 36 = 0$ by a rotation of axes. Draw a
        sketch of the graph and show both sets of axes.   (6)

    b) Simplify the equation $4x^2 + 4xy + y^2 - 6x + 12y = 0$. Draw a sketch of the graph of the
        equation and show the three sets of axes.   (6)

    c) An equation of conic is $r = \dfrac{2}{1 - \cos\theta}$
        a) Find the eccentricity
        b) Identify the conic
        c) Write an equation of the directrix that corresponds to the focus at the pole.
        d) Draw a sketch of the curve   (6)

UNIT-II

4. a) If R is a commutative ring and $a \in R$, show that $Ra = \{xa \mid x \in R\}$ is an ideal of R.   (6)

    b) Prove that a homomorphism $\phi : R \rightarrow R'$ is an isomorphism if and only if $I(\phi) = \{o\}$
        where $I(\phi)$ is the kernel of ϕ.   (6)

    c) Let R be a commutative ring with unit element whose only ideals are (o) and R itself,
        Prove that R is a field.   (6)

5. a) Prove that a finite integral domain is a field.   (6)
    b) If ϕ is a homomorphism of a ring R into a ring R', prove that kernel of ϕ is an ideal of R.   (6)

    c) If U and V are ideals of a ring R, Prove that $U + V = \{u + v \mid u \in U, v \in V\}$ is also an ideal of R   (6)

UNIT-III

6. a) Prove that an ideal P is a prime ideal of Z if and only if either $P = (0)$ or $P = pZ$ for some prime p. (6)

   b) If p is a prime number of the form $4n+1$, then prove that $p = a^2 + b^2$ for some integers a and b. (6)

   c) Let R be a Euclidean ring and $a, b \in R$. If $b \neq 0$ is not a unit in R, prove that $d(a) < d(ab)$ (6)

7. a) In a Euclidean ring R, prove that any two elements a and b have a greatest common divisor d and $d = \lambda a + \mu b$ where $\lambda, \mu \in R$. (6)

   b) Prove that if R is a commutative ring with unit element and M is an ideal of R then M is a maximal ideal of R if and only if R/M is a field. (6)

   c) If $f(x)$ and $g(x)$ are two non-zero elements of the Polynomial ring $F[x]$, prove that $\deg(f(x).g(x)) = \deg f(x) + \deg g(x)$. (6)

UNIT-IV

8. a) Find all values of $(-8i)^{1/3}$ (6)

   b) Suppose that $f(z) = u(x, y) + iv(x, y)$, $z_0 = x_0 + iy_0$ and $w_0 = u_0 + iv_0$ then prove that $\lim_{z \to z_0} f(z) = w_0$ if and only if $\lim_{(x,y) \to (x_0, y_0)} u(x, y) = u_0$ and $\lim_{(x,y) \to (x_0, y_0)} v(x, y) = v_0$ (6)

   c) If $f(z) = |z|^2$, show that $f'(z)$ exists at the origin z=0 and $f'(z)$ does not exist if $z \neq 0$. (6)

9. a) i) Find the principal argument $Arg z$ when $z = (\sqrt{3} - i)^6$. (6)

   ii) Find the domain of the function $f(z) = \dfrac{1}{1 - |z|^2}$

   b) If $f(z) = \dfrac{1}{z}$ then show that $f'(z) = -\dfrac{1}{z^2}$ where $z \neq 0$ by using the polar form of Cauchy Riemann equations. (6)

   c) Suppose that $f(z) = u(x, y) + iv(x, y)$ and $f'(z)$ exists at a point $z_0 = x_0 + iy_0$. show that the first order partial derivatives of u and v must exist at (x_0, y_0) and they satisfy the Cauchy Riemann equations $u_x = v_y$ and $u_y = -v_x$ at (x_0, y_0). (6)

UNIT-V

10. a) i) Show that $f(x) = e^y e^{ix}$ is nowhere analytic. (6)
    ii) Find the singular points of the function

$$f(z) = \frac{z^3 + i}{z^2 - 3z + 2}$$

   b) Find the harmonic conjugate of $u(x, y) = 2x - x^3 + 3xy^2$ (6)

   c) Evaluate $\int\limits_0^\infty e^{-zt} dt \quad (\text{Re } Z > 0)$ (6)

11. a) If a function $f(z) = u(x, y) + iv(x, y)$ is analytic in a domain D, then prove that its Components u and v are harmonic in D. (6)

   b) If m and n are integers then find the value of $\int\limits_0^{2\Pi} e^{im\theta} e^{-in\theta} d\theta$ for $m = n$ and for $m \neq n$. (6)

   c) Let C be the semi-circular path $z = 3e^{i\theta}$ $(0 \leq \theta \leq \pi)$ from the point $z = 3$ to the point $z = -3$. Find $\int\limits_C z^{1/2} dz$. (6)

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CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019

MICROBIOLOGY- IV
MICROBIAL PHYSIOLOGY AND METABOLISM

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I.   Answer any TEN of the following: 10x2=20
   a) Catabolism
   b) Photosynthesis
   c) Acid Rain
   d) ATP
   e) Grana
   f) Global warming
   g) Butanediol Fermentation
   h) Stoma in Chloroplast
   i) Biogeochemical cycles
   j) ETC
   k) Quantasome
   l) Nitrification

PART-B
UNIT-I

Answer any TWO complete questions of the following: 2x10=20

II. a) Differentiate Homolatic Acid Fermentation from Heterolactic Acid fermentation. 06
     b) Write the schematic representation of EMP pathway.   04

III. a) Explain Gluconeogenesis in detail.   06
     b) Explain HMP Pathway.   04

IV. a) Explain TCA cycle in detail.   06
     b) Write a note on propionic acid fermentation.   04

UNIT-II

Answer any TWO complete questions of the following: 2x10=20

V.   a) Discuss about the Prokaryotic Photosynthetic Apparatus.   06
     b) Write a note on Cyclic Photophosphorylation.   04

VI. a) Discuss C_3 cycle in detail.   06
     b) Differentiate Plant and Bacterial Photosynthesis.   04

VII. a) Explain Non cyclic Photophoshorylation.   06
     b) Write a note on Photosynthetic Pigments.   04

UNIT-III

Answer any TWO complete questions of the following: 2x10=20

VIII. a) Explain Phosphorous cycle with a neat diagram.   06
      b) Write a note on Green House Effect.   04

IX. a) Discuss the formation development and significance of Biofilms.   06
     b) Explain Oxidation of Hydrogen and Sulphur.   04

X.   a) Discuss Carbon Cycle.   06
     b) Give a brief Account on Eutrophication.   04

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STA 401.1   Reg. No. ....

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
STATISTICS
STATISTICAL INFERENCE

Time: 3 Hrs   Max. Marks: 80
                        PART - A
Answer any TEN of the following: 2X10=20

1. a) Define simple and composite hypothesis.

    b) What are Type I and Type II errors w.r.t. testing of hypothesis.

    c) Define power of a test procedure.

    d) Give the statement of Neyman and Pearson Lemma.

    e) What do you mean by one sided and two sided alternative?

    f) What is P.Value? How do you use it in tests of hypothesis?

    g) Define unbiased and consistent test.

    h) What is Yate's correction for continuity?

    i) Give any two applications of χ^2 tests.

    j) What is the need of sequential test?

    k) What is large scripts approximation of median test?

    l) Mention any two advantages of non-parametric tests.

                        PART – B
Answer any TWO of the following: 10x2=20

2. a) 'x' is a random sample of size one from Poisson Distribution with parameter θ. To test $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (> \theta_0)$ the critical region $C = (x : x > 3)$ is used. Find size and power of the test.

    b) Show that MP tests obtained using Neyman Pearson Lemma an unbiased.   (4+6)

3. Derive a most powerful test of size α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1 (> \mu_0)$ in $N(\mu, \sigma^2)$, σ^2 unknown.   (10)

4. Derive LRTP for testing equality of means of two independent normal populations whose variances are common but unknown.   (10)

Answer any TWO of the following: 10x2=20

5. a) P is the proportion of individuals possessing a specified characteristic in a population. Obtain the large sample test for testing $H_0 : P = P_0$ against $H_1 : P \neq P_0$. State the critical region for (i) $P > P_0$ (ii) $P < P_0$.

   b) Explain the significance test for correlation coefficient in a bivariate Normal Population and also give test procedure for large sample. (5+5)

6. a) Stating the assumption clearly describe Chi-square test of goodness of fit. Identify the degrees of freedom.

   b) Derive Brandt-Snedecors formula for Chi-square test statistics for testing the independence of attributes in a $2 \times k$ contingency table. (4+6)

7. a) For a 2×2 contingency table given by $\dfrac{a \mid b}{c \mid d}$ show that the χ^2 statistic for testing the independence of attributes is $\dfrac{N(ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)}$ where $N = a+b+c+d$.

   b) Describe the large sample test for testing $H_0 : \rho_1 = \rho_2$ where ρ_1 and ρ_2 are the correlation coefficients between the variates in two independent bivariate normal populations. (5+5)

Answer any TWO of the following: 10x2=20

8. a) Derive SPRTP for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1 (> \lambda_0)$ where λ is the parameter of Poisson distribution. Describe how the test can be carried out graphically?

   b) What is mean by Wilcoxon Sign test? (7+3)

9. a) Derive SPRTP for testing $H_0 : p = p_0$ against $p = p_1 (> p_0)$ when p is the proportion of units belonging to a specified class in a population. Give expression for acceptance and rejection numbers.

   b) Explain Mann Whitney U test. (6+4)

10. a) Describe the Median test. Derive the null distribution of the test statistic.

    b) Describe Two Sample Run Test. (5+5)

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ZOO401.3

Reg. No. ....

CREDIT BASED FOURTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
ZOOLOGY
Endocrinology, Histology, Animal Behaviour and Applied Zoology

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.   What are sertoli cells?

    2.   Define social behavior among animals.

    3.   What are layers?

    4.   What is goiter?

    5.   Define courtship behavior.

    6.   Give any two examples for draught breeds of cattle.

    7.   What is vermiwash?

    8.   Name any two types of learnt behavior.

    9.   Name any two migratory birds.

    10. What are the crypts of leiberkuhn located?

    11. Mention any two functions of oxytocin.

    12. Define Pisciculture.

PART-B
UNIT-I

II.   a)   Describe the histology of Intestine of a mammal.   07

      b)   Write a note on endocrine pancreas.   03

III. a)   Describe the histology of liver of a mammal.   07

      b)   Write a note on graffian follicle   03

IV.   a)   List any five functions of growth hormone   05

      b)   Write a note on hormones of placenta.   05

UNIT-II

V.   a)   What is catadromous migration? Explain with an example   07

      b)   Write a note on parental care in Rhacophorous and Salamander.   03

| VI. | a) | Explain social organization in honeybees. | 07 |
| | b) | Write a note on foraging behavior. | 03 |

| VII. | a) | Explain the different types of nests in birds. | 05 |
| | b) | List any five advantages of bird migration. | 05 |

UNIT-III

| VIII. | a) | Explain the process involved in storing of vermicompost | 07 |
| | b) | Write a short note on semi intensive method in poultry. | 03 |

| IX. | a) | Give an account of desi breeds in cattle. | 07 |
| | b) | Comment on Gold fish and Gauramis. | 03 |

| X. | a) | Describe the techniques used in culturing shrimps. | 05 |
| | b) | Write a note on byproducts of milk. | 05 |

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CHE 601.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
CHEMISTRY
PAPER VII: GENERAL CHEMISTRY

Duration: 3 hours   Max Marks: 80

Note: 1. Write question numbers and subdivisions clearly.
      2. Write chemical equations and diagrams wherever necessary.

PART A

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

   a)   What are covalent organometallic compounds? Give an example.

   b)   Calculate the magnetic moment for Fe^{+2} ion based on spin only formula.

   c)   What are labile complexes? Give an example.

   d)   Give IUPAC names of following organo metallic compounds

         (i) $Ni(CO)_4$ (ii) $(C_5H_5)_2 Fe$

   e)   KCl is employed in the preparation of salt bridge. Why?

   f)   Calculate the e.m.f. of the following concentration cell at $25°C$

         $$Ag\left|\begin{matrix}AgNO_3\\0.01M\end{matrix}\right|\left|\begin{matrix}AgNO_3\\0.02M\end{matrix}\right|Ag$$

   g)   State Beer-Lambert's law. Write its mathematical form.

   h)   What is nuclear fission? Give an example.

   i)   What happens when pyridine is treated with $NaNH_2$?

   j)   Give the IUPAC names of (i) Furan (ii) thiophene

   k)   How will you distinguish 1, 3 – pentadiene and 1, 4 – pentadiene by UV – spectroscopy?

   l)   How many NMR signals are obtained for (i) ethyl alcohol (ii) ethyl bromide?

PART-B
UNIT-I

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

2.   a)   Explain the structure and bonding in alkyl lithium compounds.   04

     b)   What are the factors affecting crystal field parameters?   03

     c)   Write a note on spectrochemical series.   03

3.   a)   Derive the relationship between stepwise stability constants and overall stability constant for a complex.   04

     b)   Find out the orbital contribution to magnetic moment for octa hedral complexes having configuration $t_{2g}^3 e_g^0$ and $t_{2g}^6 e_g^1$ 03

     c)   Explain any two methods of preparation of organo mercury compounds.   03

4.	a)	Explain how magnetic susceptibility is determined by Gouy's method.	04
	b)	Write a note on chelate effect.	03
	c)	Give any three applications of organo aluminum compounds.	03

UNIT-II

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

5.	a)	How is *pH* of a solution determined by EMF measurement using quinhydrone electrode? .	04
	b)	Write any three differences between thermo chemical and photo chemical reactions.	03
	c)	Explain the principle of solar photo voltaic cell.	03

6.	a)	Describe the principle and experimental procedure adopted in the determination of solubility of sparingly soluble salt by EMF method.	04
	b)	A certain system absorbs 3×10^{18} quanta of light per second on irradiation for 20 minutes, 3×10^{-3} moles of the reactant reacted. Calculate the quantum yield.	03
	c)	Explain the principle of nuclear reactor.	03

7.	a)	Explain the construction and working of Hydrogen-oxygen fuel cell.	04
	b)	Explain photo sensitization with suitable example.	03
	c)	Calculate the single electrode potential of zinc electrode formed by dipping a zinc rod in $0.02M$ $ZnSO_4$ solution at 298K $_{21}$.	03

UNIT-III

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

8.	a)	With the help of molecular orbital picture explain the aromatic character of Furan.	04
	b)	What is a molecular ion peak and meta stable peak?	03
	c)	Explain the NMR spectrum of 2, 2 – dimethyl propane.	03

9.	a)	What are the different modes of vibration of a linear triatomic molecule? Which of them are IR inactive and why?	04
	b)	Give the mechanism of nucleophilic substitution in pyridine.	03
	c)	Determine the λ_{max} of .	03

$$H_2C \diagup\diagdown\diagup\diagdown CH_3 \qquad CH_3 \quad CH_3$$

10.	a)	What happens when (i) quinoline and (ii) isoquinoline are oxidized with alkaline $KMnO_4$.	04
	b)	Give an example for standard reference in NMR spectroscopy? What are its advantages?	03
	c)	Explain the IR spectrum of benzaldehyde.	03

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CHE 602.3   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
CHEMISTRY
ELECTIVE PAPER I: ANALYTICAL AND INDUSTRIAL CHEMISTRY
Duration: 3 hours   Max Marks: 80

Note: 1. Write question numbers and subdivisions clearly.
        2. Write chemical equations and diagrams wherever necessary.

PART A

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

   a)   What is post precipitation? Explain with example.
   b)   How many significant figures are there in the following numbers:
            (i) 5.0800×10^{-4} (ii) 5,000.0
   c)   What is mobile phase and stationery phase? Give an example for each.
   d)   What is TGA?
   e)   What is Ellingham diagram?
   f)   How is the ore concentrated by magnetic separation?
   g)   How is Buna-S synthesized?
   h)   Explain the synthesis of formaldehyde from C-1 petrochemicals.
   i)   What are colouring matters used in food industry?
   j)   What is 'Pasteurization'?
   k)   Write a note on calcium and its significance as a nutrient.
   l)   What are the tolerance levels for air pollutants SO_2 and NO_2.

PART-B
UNIT-I

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

2.   a)   How are errors classified?   03
     b)   Write a note on indicators.   03
     c)   Explain the principle of thin layer chromatography.   04

3.   a)   Calculate the mean and standard deviation of the following set of analytical
          results: 1.72g, 1.74g, 1.68g, 1.71g, 1.69g   03
     b)   Explain the principle of gravimetric analysis.   03
     c)   Write four applications of gas chromatography.   04

4.   a)   Explain the basic principle of flame photometry.   03
     b)   Explain complexometric titrations.   03
     c)   How can errors be minimized?   04

UNIT-II

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

5. a) With an example explain analysis of redox cycle.   03

    b) Explain Bessmer process for extraction of steel.   03

    c) Explain the synthesis of isopropyl alcohol and acetone from C-3 petrochemicals. 04

6. a) Explain the extraction of gold by Mac Arthur and Forrest cyanide process.   03

    b) Explain the synthesis of acetaldehyde from C-2 petrochemicals.   03

    c) Explain the importance of Ellingham diagrams in the extraction of metals.   04

7. a) What is i) leaching (ii) froth floatation process   03

    b) Explain Baeyer's method for purification of aluminium.   03

    c) Explain the synthesis of polythene and vinyl chloride from C-2 petrochemicals.04

UNIT-III

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

8. a) Write a note on ISI standard.   03

    b) What are potash fertilizers? Give example.   03

    c) What is meant by BOD? How is it measured?   04

9. a) What is parathion and how is it prepared?   03

    b) How is waste water treated by electro dialysis?   03

    c) How are the adulterants present in the following detected:.

       (i) Ghee   (ii) chilli powder   04

10. a) What is (i) AGMARK Standard (ii) FPO Act   04

    b) How is triple phosphate and ammonium nitrate prepared?   03

    c) Mention three measures to control soil pollution.   03

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CHE 602.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGRÉE EXAMINATION APRIL 2019
CHEMISTRY
ELECTIVE PAPER II: BIOLOGICAL CHEMISTRY

Duration: 3 hours   Max Marks: 80

Note: 1. Write question numbers and subdivisions clearly.
       2. Write chemical equations and diagrams wherever necessary.

PART A

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

   a) Write the structure of Uracil.
   b) What happens when menthol is heated with $KHSO_4$?
   c) Write the main characteristics of alkaloids.
   d) What is meant by pharmacokinetics?
   e) Give the synthesis of paracetamol.
   f) Define the term efficacy and potency.
   g) What are vitamins? Write the structure of vitamin C.
   h) How are proteins denatured? How can they be renatured?
   i) What is meant by electrophoresis?
   j) Give two important essential elements in biological processes and explain
      their biological role.
   k) Nicotine has a pyrrole derivative as side chain. Give evidence.
   l) Explain enfleurage process.

PART-B
UNIT-I

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

2. a) Explain the synthesis of caffeine.   03
   b) Give the synthesis of menthol.   03
   c) Explain with suitable example Hoffmamn's exhaustive methylation 04

3. a) Give the synthesis of nicotine.   05
   b) Elucidate the structure of citral.   05

4. a) Discuss the classification of terpenes with suitable examples. 05
   b) Discuss the constitution of coniine.   05

UNIT-II

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

5. a) What are antimalarials? Write the structure of chloroquine.   03
    b) Distinguish between sedatives, hypnotics and tranquillizers.   03
    c) What are agonists and antagonists? Illustrate with example.   04

6. a) What is meant by structure activity relationship? Give example   05
    b) What are biosensors? Give the application of biosensors in the   05
        medical, environmental and food industry.

7. a) What are receptors? Explain the working of ligand gated ion channel 05
        receptor.
    b) What is drug design? Explain the steps involved in drug design.   05

UNIT-III

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

8. a) Explain the classification of proteins based on composition.   03
    b) Explain the secondary structure of proteins   03
    c) Give the synthesis of Vitamin A   04

9. a) Explain Strecker's synthesis with an example.   02
    b) Describe Sangers method for N- terminal amino acid residue analysis. 03
    c) What is porphyrin? Explain the structure and functions of haemoglobin. 05

10. a) How is dipeptide synthesized by classical peptide method?   05
    b) Explain structure and functions of chlorophyll.   05

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

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
PHYSICS
Paper VII: Electronics

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. A. Answer any TEN of the following: 10×1=10

   i)   What are the 3 regions of transistor operations?
   ii)   Define β_{dc} of a transistor.
   iii) What is meant by biasing of a transistor?
   iv)   Define efficiency of a rectifier.
   v)   What is ac load line?
   vi)   Draw the schematic symbol of operational amplifier.
   vii) What is Barkhausen criterion for feedback oscillators?
   viii) What is slew rate?
   ix)   Draw the logic circuit for the equation Y = A+BC.
   x)   Draw the truth table of a half adder.
   xi)   What is depth of modulation of AM wave?
   xii) What is heterodyning in communication?

B. Answer any FIVE of the following: 5×2=10

   i)   What is the operating point of a transistor and what is its significance?
   ii)   What is a rectifier? Why junction diode is used as a rectifier?
   iii) Explain why CE configuration is preferred in transistor amplifier?
   iv)   Define CMRR. What is its significance?
   v)   Draw the logic circuit for XOR gate and give its truth table.
   vi)   Mention any two limitations of Amplitude Modulation.

PART – B
UNIT – I

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

2. a) What is dc load line of a transistor and how do you obtain it. Explain how a Q point is located.
   b) A bridge rectifier has a transformer secondary voltage of 20 Vrms. It supplies power to a load resistance of 1000 Ω. If the diode forward resistance is 10 Ω
      Calculate   i) output dc voltage   ii) Rectifier efficiency   **(6+4)**

3. a) With a neat diagram explain how a Zener diode can be used as a voltage regulator.
   b) Transistor with voltage divider bias uses the following components: R_1 = 47 kΩ, R_2 = 12 kΩ, R_E = 500 Ω, R_C = 1 kΩ. Assume V_{BE} = 0.6V, β = 100, V_{CC} = 12V
      Determine the operating point of the transistor   **(6+4)**

4. a) Explain the working of MOSFET in enhancement mode. Draw the necessary structural diagram.
   b) Find the current through load resistance and Zener diode in the following circuit **(6+4)**
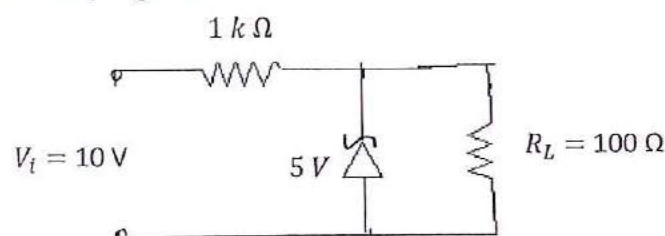
UNIT – II

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

5. a) Obtain the expression for input impedance, current gain, voltage gain, power gain, output impedance of a CE amplifier using r_e transistor model.

    b) A transistor amplifier uses $R_1 = 56$ kΩ, $R_2 = 15$ kΩ, $R_C = 1$ kΩ, $R_E = 2$ kΩ, $V_{CC} = 20$ V, $V_{BE} = 0.7$V, $\beta = 100$. Draw the dc and ac load lines and mark the operating point. **(6+4)**

6. a) What is meant by feedback in amplifiers? Why is it needed? Derive an expression for the gain in feedback amplifier in terms of feedback fraction.

    b) A non-inverting amplifier uses $R_1 = 2.2$ kΩ, $R_2 = 10$ kΩ. Calculate the output voltage, if the input voltage is 0.1 V. Also calculate output voltage when input voltage is halved. **(6+4)**

7. a) What is meant by inverting amplifier? How OPAMP can be used as inverting amplifier? Derive expression for its voltage gain and mention the values of input and output resistances.

    b) An amplifier has open loop gain of 200, uses a negative feedback with $\beta = 0.01$. What is its output voltage when the input voltage is 10 mV. **(6+4)**

UNIT – III

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

8. a) What is an adder? Explain the working of a full adder with necessary truth tables and give the logical symbol.

    b) An AM wave consists of carrier, lower and upper frequency component of peak value 8V, 2V and 4V respectively. If the AM wave drives a 20 kΩ resistor, find the power delivered to the resistor by each of frequencies. What is the power delivered? **(6+4)**

9. a) With a neat diagram, explain the working of a decade counter. Give its truth table and timing diagram.

    b) An AM wave is represented by $v = 20(1 + 0.6\, cos10^4 t) \sin 300 \times 10^4 t$. What are the minimum and maximum amplitudes of the AM wave? What are the frequency components contained in the modulated wave and what is the amplitude of each component? **(6+4)**

10. a) Draw the block diagram of a CRO. Briefly explain its various parts.

    b) Obtain the truth table for the Boolean equation $Y = A + AB\bar{C} + B\bar{C}$. Reduce the equation and draw the logic circuit for the reduced equation. **(6+4)**

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PHY 602.3   Reg. No.................................

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL2019
PHYSICS
Paper VIII: Nuclear Physics

Duration: 3 Hrs.   Max. Marks: 80

PART – A

1. A. Answer any TEN of the following: 10×1=10
    i)   Who discovered neutron?
    ii)   What are isotopes?
    iii) What is nuclear magneton?
    iv)   What is magnetic bottle?
    v)   Which is the parent element in neptunium series?
    vi)   Write the relation between range and velocity of α particles.
    vii) What is tunnel effect?
    viii) What is artificial transmutation of elements?
    ix)   Why is the length of drift tubes in LINAC gradually increased?
    x)   What is the principle of a semi conductor detector?
    xi)   Mention two methods of quenching.
    xii) Name the three original quarks proposed in quark model.

   B. Answer any FIVE of the following: 5×2=10
    i)   Show that nuclear density is a constant.
    ii)   Distinguish between two types of chain reaction.
    iii) Obtain an expression for α particle disintegration energy.
    iv)   Give one example each for (p, α) and (p, d) reactions.
    v)   Discuss the limitations of a cyclotron.
    vi)   Distinguish between leptons and hadrons.

PART – B
UNIT – I

   Answer any TWO of the following: 2×10=20
2. a) Obtain the expression for nuclear mass of a nucleus based on liquid drop model.
    b) The atomic mass of $_{10}Ne^{20}$ isotope is 19.992 amu. Calculate its binding energy with the
       prediction of liquid drop model. Given the set of coefficients:
       $a_v = 14.1 MeV, a_s = 13.0 MeV, a_c = 0.595 MeV, a_a = 19.0 MeV, a_p = 33.5 MeV$. (6+4)

3. a) Explain the terms mass defect, binding energy and binding energy per nucleon. Also
       discuss graphically the variation of average binding energy per nucleon with mass
       number.
    b) Nuclear reactor of 800 MW generates electrical power for a city using U – 235. If
       efficiency of the reactor is 25%, calculate the amount of U – 235 consumed by the
       reactor per day for continuous operation.
       [Given: Energy released per fission of U – 235 is 200 MeV].   (6+4)

4. a) Deduce the four factor formula for a nuclear reactor.
    b) Calculate the mass number of a nucleus whose radius (i) $3.46 \times 10^{-15} m$
       (ii) $4.8 \times 10^{-15} m$ ($R_0 = 1.3 \times 10^{-15} m$).   (6+4)

UNIT – II

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

5. a) Derive an expression for the number of daughter atoms present in a radioactive substance at any instance during successive disintegration.

   b) Calculate the time required for 10% of a sample of thorium to disintegrate. $T_{1/2}$ for thorium is $1.4×10^{10}$ years.   (6+4)

6. a) What is Carbon dating? Explain how to find the age of fossils using carbon dating method.

   b) $_{84}Po^{212}$ units α - particles of kinetic energy 10.54MeV. Calculate α – disintegration energy.   (6+4)

7. a) What is Q value and threshold energy of a nuclear reaction? Derive an expression for threshold energy of a nuclear reaction.

   b) Calculate the threshold energy required to initiate the reaction $N^{14}(\alpha, p) O^{17}$
   [Given: Mass of N^{14} = 14.00324 amu
        Mass of 0^{17} = 16.99913 amu
        Mass of α particle = 4.00260 amu
        Mass of proton = 1.00783 amu   (6+4)

UNIT – III

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

8. a) Deduce the expression for the energy of the particle and length of cylinder in terms of the constants of the LINAC (Linear accelerator)

   b) Protons are accelerated in a LINAC having 100 gaps with a potential difference of 1KV across each gap. Find the final energy of the protons. If the length of the first tube is 1m, What is the length of 50th tube.   (6+4)

9. a) Briefly describe the principle, construction with a diagram of a Betatron and derive the Betatron condition for successful accelerations of electrons.

   b) A Betatron working on an operating frequency of 40Hz has a stable orbit of diameter 1.6m. Find the energy gained per turn and also the final energy of magnetic field at the orbit. The magnetic field strength is 0.5T. (Assume that velocity of the electrons is nearly equal to the velocity of the light) (Given: charge of electron = $1.6×10^{-19}$C) (6+4)

10. a) Write a note on variation of cosmic ray intensity with latitude and altitude. Also explain east-west effect of cosmic ray intensity.

   b) The radius of cyclotron dee is 0.4m and the applied magnetic field is 1.5 Wb/m^2. What is the maximum energy of a beam of protons?
   [Given; mass of a proton = $1.67×10^{-27}$kg]

                                                                                (6+4)

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BOT 601.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
BOTANY
PAPER VII – PLANT BIOTECHNOLOGY

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) State the importance of cybrids.
    b) Differentiate between SSF and LSF.
    c) What is a suspension culture? Mention its importance.
    d) Give the contributions of Haberland and Steward to the field of tissue culture.
    e) Name the types of chemicals used in the production of synthetic seeds. Specify their functions.
    f) Mention the principle involved in immunological screening. Mention one use.
    g) What are androgenic haploids? Mention the advantages.
    h) What is taq polymerase? Mention its source.
    i) What are biohazards? Give any two specific examples.
    j) Write any two differences between $P^{BR\ 322}$ and $P^{UC\ 18}$.
    k) What are endotoxins? What are its effects?
    l) State any two guidelines for IPR.

PART – B
UNIT – I

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

2. a) What is a nutrient medium? Explain inorganic nutrients and PGRs.   6
    b) Explain organogenesis.   4

3. a) What is somatic hybridization? Describe the methodology of production of somatic hybrids.   6
    b) Describe the methods followed in sterilization of media and explants.   4

4. a) Explain i) Meristem culture ii) Embryo culture   6
    b) What is a callus? Explain the types.   4

UNIT – II

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

5. a) Give an account on the physical methods of DNA delivery into living cells. **6**
    b) Write note on i) Ti plasmid ii) colony hybridization   **4**

6. a) With neat labelled sketches describe the steps involved in rDNA production. **6**
    b) Define Somatic embryogenesis. Write a note on its applications.   **4**

7. a) What are Somaclonal variations? Describe the mechanism involved and any two
        significant features.   **6**
    b) Explain the methods of isolation of plant genomic DNA.   **4**

UNIT -- III

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

8. a) Describe a bioreactor with suitable diagram.   **6**
    b) What is biosafety? Write a brief note on the different levels.   **4**

9. a) Golden Rice is a transgenic plant. What are the steps involved in its production. **6**
    b) Give a flow chart of production of vit B12   **4**

10. a) Discuss the steps of microbial production of wine.   **6**
    b) Write a note on i) Edible Vaccines ii) Biodegradable plastics.   **4**

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BOT 602.5   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
BOTANY
Paper: VIII   ENVIRONMENTAL BIOLOGY & BIOMETRICS
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) Differentiate Mull and Mor humus.
   b) What are heliophytes and sciophytes? Give one example each.
   c) Define field capacity and wilting coefficient.
   d) Comment on roots of hydrophytes?
   e) What are pioneers in succession? Give two examples.
   f) How is red tide caused? Mention its effects.
   g) What is shola vegetation? Where do you find it?
   h) What is biomagnification?
   i) Define 'T' test and write its uses.
   j) What is recharging of water table.
   k) Expand IUCN.
   l) What are petroplants?

PART – B
UNIT – I

Answer any **TWO** of the following.   2x10=20
2. a) Explain the influence of temperature on vegetation.   6
    b) Write short note on vivipary and pneumatophore.   4

3. a) Explain the anatomical adaptations of Xerophytes.   6
    b) Write short notes on energy cycle.   4

4. a) Give an account of soil profile.   6
    b) Explain the negative interactions among organisms.   4

UNIT – II

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

5. a) Explain the different stages of hydrosere.   6
    b) Write a note on Sand dune vegetation.   4

6. a) Give an account of Sewage treatment.   6
    b) Write short notes on noise pollution.   4

7. a) Give an account of causes and control measures of air pollution.   6
    b) Write short notes on invasion and aggregation.   4

UNIT – III

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

8. a) Give an account of soil conservation methods.   6
    b) Write short notes on endemic plants of India and their conservation.   4

9. a) Find the standard deviation of the following data.   6

Size of the item	10	11	12	13	14	15	16
Frequency	2	7	11	15	10	4	1

    b) Write short notes on NEERI and Green Peace.   4

10. a) What is afforestation? Explain any two types.   6
    b) Write short notes on wind and solar energy.   4

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COS601.1

Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
COMPUTER SCIENCE
Paper VII – ASP.NET

Time: 3 Hrs

Max. Marks: 80

PART – A

1. Answer any TEN questions from the following: 2x10=20

a). Define the slate of a web application.

b). What is the significance of Master Page in an ASP.NET application?

c). List any four entities that are stored in the virtual directory.

d). What do you mean by PostBacks?

e). What is the use of the Panel Server Control?

f). List any four validation Controls.

g). Which are the different types of nodes in a Treeview Control.

h). What is the use of RegularExpressionValidation control?

i). What are the different templates offered by the DataList Control to display data in customized format?

j). What is data source? Mention any two Data Source controls.

k). Which are the different types of themes available in ASP.NET?

l). List any four web part controls.

PART – B
Answer any TWO full questions from each unit.

UNIT – I

2. a) Which are the different states of an application? Explain   (6)

   b) What do you mean by code sharing? Explain.   (4)

3. a) Differentiate between Post backs and Cross – Page Posting with the help of an example   (6)

   b) Explain the use of the following Server Controls   (4)

     i) TableServer Control

     ii) RadiobuttonList Server Control

4. a) Explain any six inbuilt directories for web application   (6)

   b) Explain any four advantages of ASP.NET   (4)

UNIT – II

5. a) What are the steps involved in creating an User Account in ASP.NET? Explain **(6)**

   b) Write a short note on the following controls **(4)**
      i) Login Control   ii) Login Name Control

6. a) How do you retrieve a range of dates from a selection in a Calender Control? **(6)**
      Explain.

   b) Explain any four properties of a Base Validator Class. **(4)**

7. a) What is the use of a Password Recovery Control? Explain with any two **(6)**
      properties of it.

   b) What is the use of Range Validator Control? Explain any three properties **(4)**
      that have to be set for it.

UNIT - III

8. a) Explain the different steps involved in accessing the data with Server Control. **(6)**
   b) Write a note on **(4)**
      i) Gridview Control   ii) Datalist Control.

9. a) What do you mean y disconnected Data Architecture in .NET frame work **(4)**
      Explain.
   b) Explain any four functions of a WebManager Control.

10. a) Which are the two types of Master pages that can be created in a web application? **(6)**
      Explain.
    b) Explain any four properties of SqlDataSource Control. **(4)**

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COS 602.3   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
COMPUTER SCIENCE
PAPER VIII – MICROPROCESSOR ARCHITECTURE AND 8086 PROGRAMMING
Time: 3 Hrs   Max. Marks: 80

PART – A

1. Answer any TEN questions from the following: 2x10=20

   a) What is the difference between hard wired control and micro programmed control?

   b) List the general purpose registers of 8086 microprocessor.

   c) List the different shift instructions.

   d) Write the difference between CF and AF flag registers.

   e) What is the significance of CX register in LOOP instruction?

   f) Assume CS = 3800H IP= 0600H. Determine the 20 bit address of next instruction to be executed by the processor.

   g) Name the segment registers of 8086.

   h) How do you declare a constant in 8086 program?

   i) Write similarility and difference between INC AX instruction and ADD AX, 01 instructions.

   j) Write the significance of direction flag in MOVSB instruction.

   k) Write any 4 jump instructions.

   l) Differentiate NOT and NEG instructions.

PART – B

Answer any TWO full questions from each unit.

UNIT – I

2. a) Explain any three addressing modes with one example for each.   (6)

   b) Explain the different phases involved in instruction cycle?   (4)

3. a) With a neat diagram, explain the stack organization structure 8086 microprocessor. (6)

   b) Which are the different fields of instruction format? Explain.   (4)

4. a) Explain the architecture of a bus with a neat diagram.   (6)

   b) With a diagram, explain status register bits.   (4)

UNIT – II

5. a) What is a procedure? Explain the CALL and RET instructions used with procedure. (6)

   b) What do you mean by byte sized and word sized data? How it is defined in program?
                                                                              (4)

6. a) Explain the internal architecture of 8086 microprocessor. (6)

   b) What is the significance of END and ENDS directives in 8086 programs? (4)

7. a) Explain the memory mapping of 8086 microprocessor. (6)

   b) With the rules for variables in8086 programming. (4)

UNIT – III

8. a) Explain the following instructions with the help of an example for each. (6)
      i) MUL   ii) MOV   iii) XOR

   b) Compare the instructions CMPSB and SCASB. (4)

9. a) Explain the following types of interrupts . (6)
      i) Hardware interrupts ii) software interrupts iii) Exception interrupts

   b) Given SI = 2030H DI = 405AH. What will be the content of SI and DI after the execution of the following set of instructions?
      i) CLD   ii) STD
          MOVSB   LODSB   (4)

10. a) Explain the working of any three rotate instructions. (6)

    b) Explain any two conditional branch instructions. (4)

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Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019

MATHEMATICS

PAPER VII: PARTIAL DIFFERNTIAL EQUATIONS, VECTOR SPACES AND SERIES

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) Assuming the condition of integrability, solve

$$(y \cos xy - \sin y)dx + (x \cos xy - x \cos y)dy + 2zdz = 0$$

b) Eliminate a and b from $\dfrac{x^2}{a^2} + \dfrac{y^2}{a^2} + \dfrac{z^2}{b} = 1$

c) Solve $p \tan x + q \tan y = \tan z$

d) If U and W are subspaces of a vector space V over F then prove that
$U + W = \{ u + w \mid u \, \varepsilon U, w \, \varepsilon W \}$ is a subspace of V.

e) Prove that the vectors $(1, 1, 0, 1)$ $(0, 2, -1, 0)$ and $(0, 0, 0, 3)$ in R^4 are linearly independent.

f) Prove that the orthogonal complement $W^\perp$ of the subspace W of V is a subspace of V.

g) If $T, U : V \to W$ are any two linear transformations, prove that $T + U : V \to W$ defined by $(T + U)(v) = T(v) + U(v)$ is linear.

h) Prove that the null space of a linear transformaton of V into W is a subspace of V.

i) Define elementary raw operations on a matrix.

j) Determine whether the series $\displaystyle\sum_{n=1}^{\infty} \dfrac{n^2 + 1}{2n^2}$ is convergent or divergent

k) Determine whether the sequence $\left\{ \dfrac{n}{2n+1} \right\}$ is monotonic or not.

l) Determine whether the sequence $\left\{ n \sin \dfrac{\pi}{n} \right\}$ is convergent or divergent.

m) Prove that the series $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \dfrac{n}{2^n}$ is absolutely convergent.

n) Determine if the series $\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{[\log(n+1)]^n}$ is convergent or divergent.

o) Determine whether the series $\displaystyle\sum_{n=1}^{\infty} \dfrac{1}{\sqrt{n}}$ is convergent or divergent.

UNIT-I

2. a) Assuming the condition of integrability solve
$(2xz - yz)dx + (2yz - zx)dy - (x^2 - xy + y^2)dz = 0$ (6)

b) Solve $q(p - \sin x) = \cos y$ (6)

c) Solve $p^2 + q^2 = npq$ (6)

3. a) Assuming the condition of integrability solve
$(y^2 + yz)dx + (xz + z^2)dy + (y^2 - xy)dz = 0$ (6)

b) Obtain the partial differential equation of all spheres whose centres lie on the plane $z = 0$ and whose radius is constant and equal to r. (6)

c) Solve $p(1 + q^2) = q(z - 1)$ (6)

UNIT-II

4. a) Let V be a vector space over a field F and let $U_1, U_2, ..., U_n$ be subspaces of V. If V is the internal direct seem of $U_1, U_2, ..., U_n$ then prove that V is isomorphic to the external direct sum of $U_1, U_2, ..., U_n$. (6)

b) If V is a vector space over a field F and $v_1, v_2, .., v_n$ are nonzero vectors in V then prove that either they are linearly independent or some v_k is a linear combination of the preceding ones $v_1, v_2, ..., v_{k-1}$. (6)

c) If V is a finite dimensional vector space over a field F and W is a subspace of V then prove that W is finite dimensional and $\dim W \le \dim V$. (6)

5. a) If V is a vector space over a field F, $\{v_1, v_2, ..., v_n\}$ is a basis of V over F and $w_1, w_2, ..., w_m$ are linearly independent over F then prove that $m \le n$ (6)

b) If V is an inner product space over a field F and $u, v \varepsilon V$, then prove that $|(u, v)| \le \|u\| \|v\|$ (6)

c) If V is a finite dimensional inner product space over a field F and W is a subspace of V then prove that, $V = W + W^{\perp}$. Also show that V is the direct sum of $W, W^{\perp}$. (6)

UNIT-III

6. a) Prove that the product of two linear transformations of a vector space V onto itself is linear. (6)

b) Find the rank of the matrix $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 4 & 1 \\ 1 & 3 & 0 \end{pmatrix}$

c) If $T : V \to W$ is any linear transformation, then prove that rank T+ nullity T = dim V.

(6)

7. a) Prove that the transformation $T : R^2 \to R^3$ defined by $(x, y) T = (x + y, x - y, 2x)$ is linear. Prove that it is one to one.

(6)

b) Prove that a linear transformation T of a vector space V with finite basis $\alpha_1, \alpha_2, ..., \alpha_n$ is non singular if and only if the vectors $\alpha_1 T, \alpha_2 T, ..., \alpha_m T$ are linearly independent in V.

(6)

c) Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 3 & 4 \\ 4 & -3 \end{pmatrix}$

(6)

UNIT-IV

8. a) Prove that a bounded monotonic sequence is convergent.

(6)

b) If the infinite series $\sum_{n=1}^{\infty} u_n$ is convergent, then prove that $\lim_{n \to \infty} u_n = 0$ Is the converse true? Justify your answer.

(6)

c) Prove that if $|r| < 1$, then the geometric sequence $\{r^n\}$ converges to zero.

(6)

9. a) Prove that a convergent monotonic sequence is bounded.

(6)

b) Prove that the sequence $\left\{ \dfrac{n^2}{2n+1} \sin \dfrac{\pi}{n} \right\}$ is convergent.

(6)

c) Discuss the convergence of $\sum_{n=1}^{\infty} \dfrac{1}{n(n+1)}$

(6)

UNIT-V

10. a) Determine whether the infinite series $\sum_{n=1}^{\infty} \dfrac{1}{(n^2 + 2)^{1/3}}$ is convergent or divergent.

(4)

b) Prove that the series $\sum_{n=2}^{\infty} \dfrac{1}{n\sqrt{\log n}}$ is divergent.

(4)

c) Prove that the alternating series $\sum_{n=1}^{\infty} (-1)^{n+1} a_n$ where $a_n > 0$ is convergent if $a_{n+1} < a_n$ and $\lim_{n \to \infty} a_n = 0$

(10)

11. a) Use the integral test to show that the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges for p > 1 and diverges for

 p ≤ 1   (6)

  b) Determine if the series $\sum_{n=1}^{\infty} (-1)^n \frac{(n+2)}{n(n+1)}$ is convergent or divergent.   (6)

  c) Prove that the series $\sum_{n=1}^{\infty} (-1)^n \frac{2}{3^n}$ is absolutely convergent.   (6)

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MAT 602.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
MATHEMATICS
PAPER VIII: NUMERICAL METHODS
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) i) Write 0.0724472 correct to 4 significant figures.

    ii) Write Newton's Raphson formula for finding a root of $f(x) = 0$

    b) If E_a and E_b are the errors in a and b respectively find the error in $\frac{a}{b}$.

    c) i) Is the equation $xe^x - \tan^{-1} x = 0$ transcendental or algebraic.

    ii) What is the condition on $\phi(x)$ in the method of iteration given by $x_{n+1} = \phi(x_n)$

    d) i) What is the nth forward difference of a polynomial of degree n?

    ii) If $y = 2^x$, find Δy for $h = 1$.

    e) What are the advantages of Lagrange's interpolation formula over Newton's formula?

    f) i) Write the error in polynomial interpolation.
        ii) Write Newton's backward interpolation formula

    g) Find the approximate value of $\int_0^1 \frac{dx}{x+1}$ correct to 3 decimal places, using trapezoidal rule
        with $h = 0.5$

    h) i) Write the formula for Simpson's $\frac{1}{3}$ rule to evaluate $\int_a^b f(x)dx$

    ii) What is the bound for error in trapezoidal rule to evaluate $\int_a^b f(x)dx$

    i) i) Write the formula for $\frac{dy}{dx}$ at $x = x_0$ when Newton's forward difference formula is
        used.

    ii) Write Simpson's $\frac{3}{8}$ rule for $\int_{x_0}^{x_3} y\,dx$

    j) i) When do we say that the system $AX = B$ is inconsistent?
        ii) Which method is also known as the method of simultaneous displacements?

k) Find all the three norms of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

l) Test whether the matrix $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$ is orthogonal.

m) In Runge-Kutta fourth order formula $y_1 = y_0 + \dfrac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$ write the expression for k_2.

n) i) Write the Euler's formula to estimate y_{n+1} from $\dfrac{dy}{dx} = f(x,y)$, $y(x_0) = y_0$.

ii) What is the order of error in Runge-Kutta method of order 2?

o) i) Write the nth approximation in Picard's method.

ii) Write Adams-Bashforth formula.

PART - B
UNIT-I

2. a) Find a real root of the equation $2x = \cos x + 3$, correct to 3 decimal places using iteration method (choose $x_0 = \dfrac{\pi}{2}$) (6)

b) Using the method of bisection, solve $x^3 - x - 1 = 0$, correct to 3 decimal places. (6)

c) Solve $x^3 - 2x - 5 = 0$, using false position method. (6)

3. a) Describe the method of bisection. (6)

b) Using Newton – Raphson method, solve $x = e^{-x}$ correct to 3 decimal places taking $x_0 = 1$ (6)

c) Solve $x^3 - 4x - 9 = 0$ by the method of false position. (6)

UNIT-II

4. a) In the table below, the values of x and y are given (6)

x	3	4	5	6	7	8	9
y	2.7	6.4	12.5	21.6	34.3	51.2	72.9

Find the tenth term of the series.

b) The population of a town in the decennial census was as given below. Estimate the population for the year 1895. (6)

Year x:	1891	1901	1911	1921	1931
Population y: (in thousands)	46	66	81	93	101

c) Prove that (6)

$$y_n(x) = y_0 + p\Delta y_0 + \frac{p(p-1)}{2!}\Delta^2 y_0 + \ldots\ldots + \frac{p(p-1)\ldots\ldots(p-n+1)}{n!}\Delta^n y_0$$

5. a) Find $\sqrt{155}$ from the following tabular values. (6)

x	150	152	154	156
$\sqrt{x}$	12.247	12.329	12.410	12.490

b) Express the function $\dfrac{x^2+x-3}{x^3-2x^2-x+2}$ as sums of partial fractions. (6)

c) From the following table, find the number of students who obtained less than 45 marks. (6)

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

UNIT-III

6. a) Using divided differences, derive Newton's general interpolation formula. (6)

b) From the following table, find $\dfrac{dy}{dx}$ at $x = 2.0$ (6)

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

c) Find the volume of the solid obtained by rotating about the x axis, the area between the x - axis, the lines $x = 0$ and $x = 1$ and a curve through the points with the following co-ordinates. (6)

x	0.0000	0.25	0.50	0.75	1.00
y	1.0000	0.9896	0.9589	0.9089	0.8415

7. a) From the following table, find x for which y is maximum correct to 2 decimals. (6)

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996

b) Certain corresponding values of x and $\log_{10} x$ are
(300, 2.4771), (304, 2.4829), (305, 2.4843) and (307, 2.4871).
Find $\log_{10} 301$ using Newton's divided difference formula. (6)

c) The velocities of a car (running on a straight road) at intervals of 2 minutes are given below. Find the distance traversed by the car. (6)

Time in minutes	0	2	4	6	8	10	12
Velocity in Km/hr	0	22	30	27	18	7	0

UNIT-IV

8. a) Find the inverse of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ using Gauss-elimination method. (9)

   b) Using Gauss-Seidel method solve the system.
   $10x + 2y + z = 9$
   $2x + 20y - 2z = -44$
   $-2x + 3y + 10z = 22$ Carry out four iterations (9)

9. a) Find whether the system is consistent.
   $2x - 3y + 5z = 1, \quad 3x + y - z = 2, \quad x + 4y - 6z = 1$ (9)

   b) Explain Jacobi's method to solve the system of linear equations. (9)

UNIT-V

10. a) Obtain $y(0.1)$, correct to 3 decimal places, if $y(x)$ satisfies $y' = x - y^2$; $y(0) = 1$ using Taylor series method. (6)

    b) Use Runge-Kutta method of order four to find y (0.2) for the equation $y' = 1 + y^2$ where $y(0) = 0$, $h = 0.2$. (6)

    c) Derive Adams-Moulton corrector formula to solve $\frac{dy}{dx} = f(x, y)$. (6)

11. a) Using modified Euler method find y (0.1) for the equation $y' = x^2 + y$ given $y(0) = 1$ (Take $h = 0.05$) (6)

    b) Using Runge-Kutta method of order 2, determine $y(0.1)$ and $y(0.2)$ for
    $\frac{dy}{dx} = y - x$, $y(0) = 2$ correct to 4 decimal places (take $h = 0.1$) (6)

    c) Using Adams-Bashforth predictor corrector formula find for $\frac{dy}{dx} = 1 + y^2$, with $h = 0.2$
    compute y (0.8). Given $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$ (6)

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MAT 602.3   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
MATHEMATICS
PAPER VIII: GRAPH 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)   Prove that the maximum number of edges in a simple connected graph is $\dfrac{n(n-1)}{2}$

    b)   Define the terms i) path ii) Walk in a graph

    c)   Define 'Euler graph' with an example.

    d)   Write down the fundamental cut sets in the following graph with respect to the spanning
         tree $T = \{a, b, c\}$
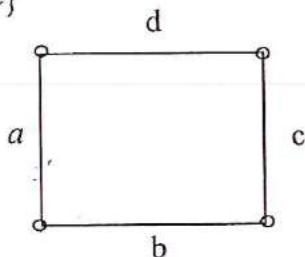
    e)   In any simple planar graph with f regions, n vertices e edges, prove that $e \geq \dfrac{3}{2} f$

    f)   Prove that the edge connectivity of a graph G cannot exceed the degree of the vertex with
         the smallest degree in G.

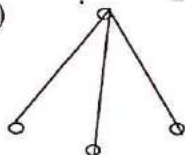   g)   Write the circuit matrix of the graph G given below
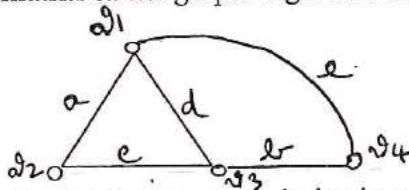
    h)   Draw the graph whose adjenency matrix is given below.

$$\begin{array}{c} v_1 \\ v_2 \\ v_3 \\ v_4 \end{array} \begin{pmatrix} v_1 & v_2 & v_3 & v_4 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix}$$
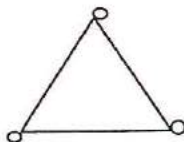
    i)   Prove that set of circuit vectors in W_G forms a subspace W_Γ.

    j)   Write the chromatic number of the following graphs
         (i)   ii)
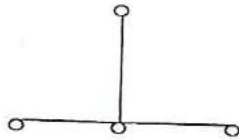
k) Write chromatic polynomial of the graph given below.

l) Prove that a circuit with n vertices, $n \geq 3$, is 2-chromatic if n is even and 3-chromatic if n is odd.

m) Define weakly connected and strongly connected digraphs.

n) Prove that an Euler digraph is connected and balanced.

o) Draw two different arborescences with 3 vertices.

PART - B

UNIT-I

a) Prove that every connected graph has at least one spanning tree.   (6)

b) Prove that a connected graph G is an Euler graph if and only if all vertices are of even degree.   (6)

c) Find the centers of the following tree   (6)
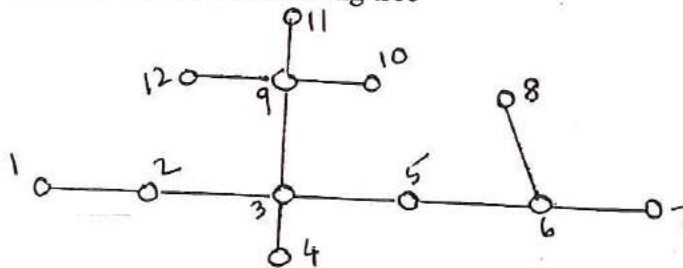
3. a) Prove that a graph G with n vertices and $n-1$ edges and no circuit is connected.   (6)

b) If a graph has exactly two vertices of odd degree then prove that there exists a path joining these two vertices.   (6)

c) Define distance between two vertices in a graph and show that distance between the vertices in a connected graph is a metric.   (6)

UNIT-II

4. a) Prove that in a connected graph G, any minimal set of edges containing at least one branch of every spanning tree of G is a cut set.   (6)

b) With respect to a given spanning tree T, prove that a chord c_i that determines a fundamental circuit Γ occurs in every fundamental cut set associated with the branches in Γ and in no other.   (6)

c) Prove that Kuratowski's second graph is non planar.   (6)

5. a) Prove that the vertex connectivity of any graph G can never exceed the edge connectivity of G.

(6)

b) Prove that a graph can be embedded in the surface of a sphere if and only if it can be embedded in a plane.

(6)

c) Prove that a connected planar graph with n vertices and e edges has $e-n+2$ regions.

(6)

UNIT-III

6. a) If A(G) is the incidence matrix of a connected graph G with n vertices then prove that rank of A(G) is $n-1$.

(6)

b) Define cutset matrix of a graph. Write the cutset matrix of the following graph.   (6)
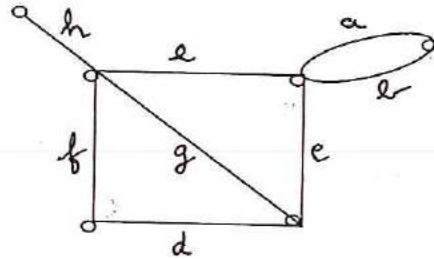

c) In a vector space of a graph prove the circuit subspace and the cutset subspace are orthogonal to each other

(6)

7. a) Prove that the reduced incidence matrix of a tree is nonsingular.

(6)

b) Write the path Matrix $P(v_1, v_5)$ of the following graph.
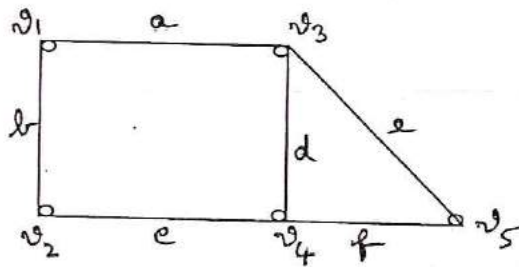
c) Prove that the rank of the cutset matrix is equal to the rank of the incidence matrix.   (6)

8. a) Prove that a graph of n vertices is a complete graph if and only if its chromatic polynomial is $P_n(\lambda) = \lambda(\lambda-1)(\lambda-2)\cdots(\lambda-n+1)$ (6)

    b) Prove that every tree with two or more vertices is 2 chromatic. (6)

    c) Let a and b be two non adjacent vertices in a graph G. Let G' be a graph obtaining by adding an edge between a and b. Let G'' be the simple graph obtained from G by fusing the vertices a and b together and replacing sets of parallel edges with a single edge. Prove that $P_n(\lambda)$ of G $= P_n(\lambda)$ of $G' + P_{n-1}(\lambda)$ of G'' (6)

9. a) Prove that a graph with n vertices is a tree if and only if its chromatic polynomial is

    $P_n(\lambda) = \lambda(\lambda-1)^{n-1}$ (6)

    b) Find the chromatic polynomial of the following graph. (6)
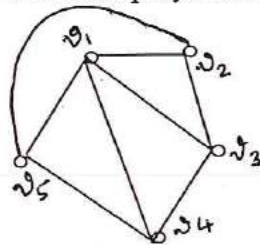
    c) Prove that a graph with at least one edge is two chromatic if and only if it has no circuit of odd length. (6)

UNIT-V

10. a) If B is a circuit matrix and A is the incidence matrix of a self-loop-free digraph such that the columns in B and A are arranged using the same order of edges, then prove that $A.B^T = B.A^T = 0$. (6)

    b) Define incidence matrix for the digraph. Draw the digraph for the incidence matrix given below. (6)

$$A = \begin{array}{c} \\ v_1 \\ v_2 \\ v_3 \\ v_4 \end{array} \begin{bmatrix} a & b & c & d \\ 1 & 0 & -1 & 0 \\ -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 1 \\ 0 & 0 & 0 & -1 \end{bmatrix}$$

    c) Show that the determinant of every square submatrix of the incidence matrix of a digraph is digraph is 1, -1, or 0. (6)

11. a) State an algorithm for the construction of directed Euler line in an Euler diagrph G and justify it. (6)

    b) Let A_f be the reduced incidence matrix of a connected digraph G, then prove that the number of spanning trees in the graph equals the value of determinant of $(A_f \cdot A_f^T)$. (6)

    c) In an arborescence prove that there is a directed path from the root R to every other vertex. (6)

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MIC 601.1   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
FOOD, DAIRY AND INDUSTRIAL MICROBIOLOGY

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I.   Answer any <u>TEN</u> of the following: 10x2=20
   a) Botulism
   b) Ensilage
   c) Bacillus cereus
   d) Natural Media
   e) SWL
   f) Must
   g) Ropy Milk
   h) Irradiation
   i) Stock culture
   j) Lactobacillus
   k) Cheese
   l) Souring of Milk

PART-B
UNIT-I

Answer any TWO complete questions of the following: 2x10=20

II. a) Discuss the contamination of fruits and vegetables.   06
     b) Write a note on Salmonellosis.   04

III. a) Discuss the fermented food products.   06
     b) Write a note on Mycotoxins.   04

IV. a) Discuss preservation of food by Radiation.   06
     b) Write a note on chemical properties of food responsible for spoilage.   04

UNIT-II

Answer any TWO complete questions of the following: 2x10=20

V.   a) Discuss the sources of microbial contamination of milk.   06
     b) Write a note on SPC.   04

VI. a) Discuss preservation of Milk by sterilization.   06
     b) Write a note on Phosphatase Test.   04

VII. a) Discuss the dye reduction tests for milk.   06
     b) Write a note on Proteolytic and Lipolytic activities of microbes in milk.   04

UNIT-III

Answer any TWO complete questions of the following: 2x10=20

VIII. a) Discuss the industrial production of Streptomycin.   06
      b) Write briefly on the Agitating device used in fermentors.   04

IX. a) Discuss the industrial production of Vitamin B 12.   06
     b) Write a brief note on preservation of stock cultures.   04

X.   a) Discuss the industrial production of Citric Acid.   06
     b) Write a note on Riboflavin.   04

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MIC 602.5   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
MICROBIOLOGY
PAPER VIII- BACTERIAL GENETICS

Duration: 3 Hours   Max Marks: 80

Note: Draw diagrams wherever necessary.

PART A

I.   Answer any <u>TEN</u> of the following: 10x2=20
    a)   Lac Operon
    b)   Translocation type of Mutation
    c)   Super Bug
    d)   Topoisomerases
    e)   Restriction Enzymes
    f)   Terminating codons
    g)   Recombinant DNA Technology
    h)   Frameshift Mutation
    i)   m RNA
    j)   Genetic code
    k)   Nif genes
    l)   Transgenic Plants

PART-B
UNIT-I

Answer any TWO complete questions of the following: 2x10=20

II. a)   Explain the process of transformation in Prokaryotes   06
    b)   Write a note on Gene Expression.   04

III. a)   Explain the process of protein synthesis.   06
    b)   Write a note on structure of DNA.   04

IV. a)   Explain the enzymes involved in DNA Replication.   06
    b)   Write a note on generalized Tranduction.   04

UNIT-II

Answer any TWO complete questions of the following: 2x10=20

V.   a)   Explain the types of mutation caused due to the agents that modify DNA.   06
    b)   Write a short note on DNA Repair.   04

VI. a)   Explain the types of Mutation caused due to Radiations.   06
    b)   Write a short note on Base Pair Substitution.   04

VII. a)   Explain the isolation of biochemical Mutants by Replica Plating Technique.   06
    b)   Write a note on Spontaneous Mutation.   04

UNIT-III

Answer any TWO complete questions of the following: 2x10=20

VIII. a)   Explain the various cloning vectors used in Genetic Engineering.   06
    b)   Write a note on potential hazards of Genetic Engineering.   04

IX. a)   Explain the shot gun method for DNA Isolation.   06
    b)   Write a note on Principles of Genetic Engineering.   04

X.   a)   Explain splicing and insertion of DNA.   06
    b)   Write a note on the Hosts used for Cloning.   04

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STA 601   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
STATISTICS
PAPER- VII   DESIGN OF EXPERIMENTS

Time: 3 Hrs   Max. Marks: 80
PART - A
Answer any TEN of the following: 10X2=20

1. a) What do you mean by design experiments.

   b) Define i) experimental unit ii) experimental error

   c) Distinguish between treatments and blocks.

   d) State the assumptions of ANOVA.

   e) Write down the least square estimates of μ and αi in the model $y_{ij} = \mu + \alpha_i + e_{ij}$ $(i = 1......k; j = 1......ni)$

   f) Mention any two advantages of CRD.

   g) Write down an expression for one missing observation in RBD.

   h) What do you mean by factorial experiment?

   i) Explain contrasts and orthogonal contracts.

   j) Give one example for self conjugate LSD.

   k) What do you mean by confounding?

   l) Write expressions for main effect A and an interaction effect AB in case of 2^2 factorial experiment.

PART – B
Answer any TWO of the following: 10x2=20

2. Stating the basic assumptions, models used and the hypothesis being tested, distribution of test statistic obtain ANOVA table for two-way classified data.   (10)

3. Find the least square estimates of the parameters μ, α_i, β_j and γ_k in case of three-way classified data. Break the total variation and find the expectation of sum of squares due to factor A.

(10)

4. Give one example for design of experiments and explain three basic principles of design of experiments.   (10)

Answer any TWO of the following: 2x10=20

5. Explain how do you estimate 2 missing values in LSD and write down the ANOVA table.
(10)

6. Derive an expression to measure efficiency of LSD over RBD with columns as blocks.

(10)

7. Explain RBD. Give the layout of the design with 5 treatments and 4 blocks. Mention its advantages and disadvantages.

(10)

Answer any TWO of the following: 10x2=20

8. a) Show that main effects and interaction effects are orthogonal contrasts of treatment means in 2^2 factorial experiment.

b) Describe Yate's method of computing factorial effects in 2^3 factorial experiment.

(7+3)

9. Describe the analysis of 2^3 factorial experiment carried out in RBD and write down the ANOVA table.

(10)

10. Distinguish between complete confounding and partial confounding. Explain how the statistical analysis is carried out in case of partial confounding in 2^3 factorial experiment.

(10)

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STA 602.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
STATISTICS – VIII
STATISTICAL QUALITY CONTROL

Time: 3 Hrs   **Max. Marks: 80**

PART - A

Answer any TEN of the following: **2X10=20**

1. a) Define statistical quality control.

    b) What are probability limits?

    c) If $U - L > 6\sigma^1$, What is your conclusion about process capability?

    d) Define fraction defective.

    e) The average number of defects is found to be 4.84, find control limits for number of defects chart.

    f) Define producer's risk.

    g) What is AQL?

    h) Explain LTPD.

    i) Define SSP by attributes.

    j) Write down the ATI and AOQ expressions for SSP by attributes.

    k) What is indifference quality?

    l) Find out the reliability of the system with 4 components connected in parallel having reliabilities 0.97, 0.94, 0.92 and 0.89 respectively.

PART – B

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

2. a) Distinguish between chance causes and assignable causes of variation in quality.

    b) What are process control and product control? How are they achieved?   **(5+5)**

3. a) Explain the role of SQC in industries.

    b) Write a short note on rational subgroup.   **(6+4)**

4. a) Explain specification limits and warning limits.

    b) What are the criteria of lack of control with respect to control chart for variables? **(4+6)**

Answer any TWO of the following: 10x2=20

5. Derive the control limits for $\bar{x}$, R and σ charts
   When i) Standard values are known
         ii) Standard values are unknown (10)

6. a) Give the theoretical basis for constructing p and np charts.

   b) Distinguish between defect and defective with an example each. (5+5)

7. a) Distinguish between control charts for variables and attributes.

   b) Write down the applications of C-chart. (6+4)

Answer any TWO of the following: 10x2=20

8. a) What is acceptance sampling? Describe the need of acceptance sampling.

   b) Derive an expression for AOQ in SSP for attributes. (5+5)

9. a) How do you construct SSP for attributes when two points on O.C curve are given.

   b) Stating the assumption construct SSP for variables when upper specification limit is given
      and σ is unknown. (5+5)

10. a) Explain reliability of a component and hazard function.

    b) Explain Bath tub curve and Structure function of the system. (5+5)

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ZOO 601.2   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
ZOOLOGY
GENETICS, EVOLUTION AND PALAENTOLOGY
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

   a. What is a test cross?

   b. Define epistasis. Name the two types.

   c. What is erythroblastosis faetalis?

   d. Name the scientists who have rediscovered Mendel's research work.

   e. Define cistron and muton.

   f. Define Mutation. Who coined the term Mutation?

   g. What are gynandromorphs? Give an example.

   h. What is chorionic villi sampling?

   i. What are vestigial organs? Give two examples.

   j. Define Genetic drift.

   k. Define Hardy-Weinberg Law.

   l. What is sympatric speciation?

PART-B

UNIT-I

II. a) Write an essay on Nature and Nurture with a suitable example.   07

     b) What is back cross? Give an Example   03

III.. a) What is interaction of genes? Explain the phenomenon with reference to   07
          comb pattern in fowls.
      b) Mention any two theories of linkage.   03

IV. a) Write a note on polygenic inheritance with reference to skin color in human   05

     b) Explain the genetics of ABO blood groups in human.   05

UNIT-II

V. a) Write an essay on inborn errors of metabolism of phenylalanine.   07

    b) What is haemophilia? What are its characteristics.   03

VI.	a)	Explain sex linkage in poultry with an example.	07
	b)	What is lac operon? Name the genes found in lac operon	03
VII.	a)	Write a short note on Down syndrome	05
	b)	Write short notes on : i)XX-XY type ii) ZO- ZZ type of sex determination.	05

UNIT-III

VIII.	a)	Give an account on evidences of organic evolution from comparative physiology and biochemistry.	07
	b)	Write short on micro evolution.	03
IX.	a)	Explain evolutionary trends in horse.	07
	b)	Write reptilian features of Archaeopteryx	03
X.	a)	Explain Natural Selection with an example	05
	b)	Write notes on a) Australopithecus. b) Triceratops	05

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ZOO 602.4   Reg. No. ....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2019
ZOOLOGY
Ecology, Toxicology and Biostatistics

Duration: 3 hours   Max marks: 80

Note: 1. Answer any TEN Questions from Part-A and two full question from each
           unit of Part B
       2. Draw diagrams wherever necessary.

PART A

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

   a.   Define cyclomorphosis.

   b.   What is continental shelf?

   c.   Why are estuaries considered as ' Natrient trap zones'?

   d.   State the first and second law of thermodynamics.

   e.   Name any two methods to measure the population density.

   f.   What is a trophic niche. Give an example.

   g.   What is the percentage of CO_2 and N_2 in the atmosphere.

   h.   What is a limiting factor?

   i.   Define cumulate frequency.

   j.   What are Xenobionts?

   k.   What is global warming?

   l.   What is Biomagnification?

PART-B
UNIT-I

II.   a)   What are food chins ? Explain the various types of food chains with the help
           of schematic representation.   07

      b)   Mention the scope of ecology   03

III. a)   Draw a neat labeled diagram of soil profile and explain.   07
      b)   Write a short note on Tundra biome.   03

IV.   a)   Explain mutualism with any 2 examples.   05

      b)   Comment upon the interaction between the different components of a pond   05
           ecosystem.
UNIT-II

V.   a)   What is biogeochemcal cycle? Explain carbon cycle.   07

      b)   Write notes on Allee's Principle.   03

VI.	a)	With reference to landscape ecology, explain landscape elements	07
	b)	What is Red Data Book? Explain.	03
VII.	a)	Write explanatory notes on a) Ecotone b) Edge effect.	05
	b)	Explain population growth forms with growth curves.	05

UNIT-III

VIII.	a)	Explain the different methods of collecting primary data.	07
	b)	What are Pesticides? Describe the effect of DDT.	
IX.	a)	With reference to pollution explain: a) Acid Rain b) Eutrophication	07
	b)	Calculate mean and median for the given ungrouped data : 10,8,20,22,39,18	03
X.	a)	Discuss the biological effect of any two chemical toxicants.	05
	b)	What are the various methods of measuring Air Quality and Pollution?	05

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