[4017] – 366

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONIC SCIENCE (Paper – V)
EL 335 : 'C' Programming (New)
(2008 Pattern)

Time : 2 Hours | Total Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of calculator is **allowed**.*

1. Answer **all** of the following :

a) Give the syntax for declaring a variable in C. **1**

b) How is a structure initialized ? **1**

c) State the general format for function prototype. **1**

d) How is a pointer variable declared ? **1**

e) "C is a middle level language". Comment. **2**

f) List the relational operators in C. **2**

g) State two major problems of console oriented I/O operations. **2**

h) What is the purpose of initgraph( ) and DETECT macro ? **2**

2. Answer **any two** of the following :

a) Explain for statement with a suitable example. **4**

b) What is a recursion ? Write a C program to calculate a factorial of an integer using recursion. **4**

c) Declare a pointer p to – **4**

i) an array of integers

ii) an array of hundred integers.

P.T.O.

3. Answer **any two** of the following :

   a) Explain the following graphics functions giving their syntax and usage –
      i) ellipse ( )
      ii) closegraph ( ). **4**

   b) Explain fseek( ) and ftell( ) functions. **4**

   c) List various types of operators in C and explain arithmetic operators. **4**

4. Answer **any two** of the following :

   a) Explain switch statement with a suitable example. **6**

   b) What is a function ? Explain the formats for function definition and function access. **6**

   c) What is an array ? Write a C program for the addition of two 4×4 matrices. **6**

OR

4. Answer **all** of the following :

   a) Write a C program to convert decimal number to binary. **4**

   b) Write a C program to accept characters from a keyboard till user enters EOF and store them in a data file. **4**

   c) Write a C program using graphics mode to display a text “Welcome to Electronic Science” in the centre of the screen. **4**

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[4017] – 367

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONICS SCIENCE (Paper – VI) (Optional)
EL – 336 (A) : Fiber Optics and Fiber Optics Communication
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Draw*** *labelled diagrams* ***wherever*** *necessary.*

1. Answer **all** of the following :

a) Define Band width of an optical fiber. **1**

b) List various optical sources. **1**

c) State different types of optical link. **1**

d) List any two applications of optical fiber link. **1**

e) Draw the block diagram of general communication link. **2**

f) Calculate N.A. of an optical fiber having μ_1 (core) = 1.55 and μ_2 (cladding) = 1.50. **2**

g) What are the major requirements of an optical source ? **2**

h) What are the important sources of the losses in optical fiber ? **2**

2. Answer **any two** of the following :

a) Describe the need of optical fiber in communication with two suitable examples. **4**

b) Explain the terms acceptance angle and N.A. in case of optical fiber. **4**

c) With a suitable diagram, explain the mechanism of emission of light from an LED. **4**

P.T.O.

3. Answer **any two** of the following :

   a) What are the important considerations for laying of optical fiber in telephony ? **4**

   b) Explain any two losses in splices and connectors. **4**

   c) With a neat diagram, explain long haul communication link. **4**

4. Answer **any two** of the following :

   a) With a neat diagram, explain the fabrication of OFC using external CVD method. **6**

   b) Explain in detail the coupling mechanism of optical power from source to fiber and fiber to detector. **6**

   c) With a neat diagram, explain CATV in detail. **6**

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[4017] – 367

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONICS SCIENCE (Paper – VI) (Optional)
EL – 336 (B) : Sensors and Actuators
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Neat diagrams must be drawn ***wherever*** *necessary.*
iii) Figures to the right indicate ***full*** *marks.*

1. Attempt **all** of the following :

   a) Define sensor. **1**

   b) State two electro-optical devices used as indicators. **1**

   c) What is signal conditioning ? **1**

   d) State different types of noise. **1**

   e) "Gas sensors indicate the purity of the environment" comment. **2**

   f) State the principle of working of solenoid. **2**

   g) Determine the 1000 cut off frequency of a second order high pass butterworth filter having following components

   $R_2 = R_3 = R = 47\ k\Omega$, $C_2 = C_3 = C = 0.0022\ \mu F$. **2**

   h) Write different methods used for deposition of thin film sensors. **2**

2. Attempt **any two** of the following :

   a) Write note on i) Linearily and ii) response time in case of sensors. **4**

   b) Discuss advantages and disadvantages of semiconductor strain gauge over metal strain gauge. **4**

   c) What are important criterions used for selection of sensors for particular application ? **4**

3. Attempt **any two** of the following :

   a) How junction semiconductor diodes are used as temperature sensor ? What are the factors on which output of sensor depends ? **4**

   b) Discuss advantages of SMD technology. **4**

   c) List important temperature sensors used in automobile. Explain working of semiconductor resistance temperature sensor. **4**

4. Attempt **any two** of the following :

   a) State different types of optical detectors. In what different modes can a pn junction be used for radiation detection ? Explain their operation with suitable diagram. **6**

   b) With neat diagram explain the construction and working of stepper motor. **6**

   c) With neat diagram explain the working of instrumentation amplifier using three OPAMPs. **6**

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[4017] – 379

T.Y. B.Sc. (Semester – III) Examination, 2011
ENVIRONMENTAL SCIENCES
New Course (Paper – III)
ENV – 303 : Water Quality
(2008 Pattern)

Time : 2 Hours Total Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following in **1-2** lines **each** : **10**

   a) Define : Surfactant and give one example.

   b) When was Yamuna Action Plan (YAP) launched ?

   c) Write examples of any two prevalent diseases in India.

   d) What is meant by 'water crisis' ?

   e) Name any two sources of oil pollutants in sea water.

   f) State the difference between Pesticides and Fertilizers.

   g) What is a transport host ?

   h) Write examples of any two water borne bacterial diseases.

   i) Mention any two categories of host.

   j) What is Ballast water ?

2. Write a short note on (**any two**) : **10**

   a) Application of GIS for management of water resources.

   b) Effects of algal bloom on water quality.

   c) Detrimental effects of detergents.

P.T.O.

3. Answer **any two** from the following : **10**

   a) Describe the main pathways of groundwater pollution and give its effect.

   b) Explain direct transmission of communicable diseases.

   c) What are Ecofriendly detergents ? Explain it in detail.

4. Attempt **any one** of the following : **10**

   a) Explain any 4 physical and chemical characteristics of water. Add a note on significance of water.

   b) Describe the water analysis methods for any 3 physical and any 2 biological parameters.

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[4017] – 381

T.Y. B.Sc. (Semester – III) Examination, 2011
ENVIRONMENTAL SCIENCES
(New Course) (Paper – V)
ENV – 305 : Environmental Governance and Equity : Law and Ethics
(2008 Pattern)

Time : 2 Hours Total Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following in **1-2** lines **each** : **10**

   a) What is the purpose of "Environmental Legislation" ?

   b) Write full form of 'UNCED'.

   c) What is the statement of 'Article 51.A(g)' ?

   d) Define the term 'occupier'.

   e) What is an 'Ecomark' ?

   f) Write full form of 'PIL'.

   g) What is the purpose of 'Wildlife (Protection) Act, 1972' ?

   h) Mention any two functions of 'Environmental Laboratories'.

   i) What is meant by 'Trade Effluent' ?

   j) Which act is called as 'Umbrella Act' ?

2. Write a short note on (**any two**) : **10**

   a) National Forest Policy

   b) Functions of Central Pollution Control Board

   c) Motor Vehicle Act.

P.T.O.

3. Answer **any two** from the following : **10**

   a) What are the salient features of 'Forest (Conservation) Act, 1980' ?

   b) Explain any five principles of 'Rio Declaration'.

   c) What are the major limitations to successful implementation of environmental legislation ?

4. Attempt **any one** of the following : **10**

   a) Discuss in detail on the provisions of 'Air (Prevention & Control) Act, 1981'.

   b) What are the issues involved in environmental ethics ? Add a note on possible solutions.

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[4017] – 393

T.Y. B.Sc. (Vocational) (Semester – III) Examination, 2011
ELECTRONIC EQUIPMENT AND MAINTENANCE (Paper – VI)
Electronic Instrumentation (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of calculators is **allowed**.*

1. a) Answer the following : **(4×1=4)**

   i) State any 2 applications of a measurement system.

   ii) Name physical input for a dynamometer.

   iii) Classify the instrument – 'Analog Voltmeter'.

   iv) Define – 'accuracy'.

   b) Comment on the following : **(2×2=4)**

   i) A thermister has NTC

   ii) Proximity devices eliminate loading errors

   c) Answer the following : **(2×2=4)**

   i) What is 'hysteresis' ?

   ii) What is maximum force upto which pneumatic load cell be used ?

2. Answer **any 2** : **(2×4=8)**

   i) Write a short note on 'optical encoders'.

   ii) Explain electromagnetic frequency domain transducer.

   iii) Discuss elastic force devices.

P.T.O.

3. Answer **any 2** : **(2×4=8)**

   i) Explain relative motion devices.

   ii) Write a short note on ‘vector impedance’.

   iii) Explain transmission type dynamometer.

4. Answer **any 2** : **(2×6=12)**

   i) Give complete account of digital LCR meter.

   ii) Explain digital phase meter.

   iii) With a block diagram, explain generalized instrumentation system.

OR

4. Answer the following : **(3×4=12)**

   i) Write a short note on logic analyzer.

   ii) Discuss multichannel data acquisition system.

   iii) Explain power measurement at audio frequency.

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[4017] – 394

T.Y. B.Sc. (Vocational) (Semester – III) Examination, 2011
INDUSTRIAL MICROBIOLOGY (Paper – VI)
VOC-IND-MIC-336
Plant and Animal Tissue Culture
(2008 Pattern

Time : 2 Hours Total Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **All** questions carry **equal** marks.*
*4) Draw **neat** labeled diagrams **wherever** necessary.*

1. Define the following : **5**

a) Primary cell line

b) Anchorage dependency

c) Established cell line

d) Monolayer cultures

e) Suspension cultures.

Explain in **1-2** lines : **5**

f) What is callus culture ?

g) What is cryopreservation of plant cells ?

h) What is a vector ?

i) Enlist the enzymes used in protoplast preparation.

j) Enlist Macronutrients used in Plant Tissue Culture media.

P.T.O.

2. Answer **any two** of the following : **10**

   With the help of a diagram explain the steps involved and discuss its importance.

   a) Callus culture

   b) Anther culture/pollen culture

   c) Ovary culture/embryo culture.

3. Answer **any two** of the following : **10**

   a) Write short note on Hollow fiber reactor.

   b) Explain the difference between finite and continuous cell lines.

   c) Explain in brief, use of animal cell lines in cytotoxicity testing.

4. Answer **any one** of the following : **10**

   a) Describe different methods for disaggregation of tissue, as a initiation step in animal cell culture.

   b) Discuss in detail *Agrobacterium* mediated gene transfer in plants.

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[4017] –302

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – II)
MT – 332 : Real Analysis
(New Course) (2008 Pattern)

Time: 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **[10]**

i) Give an example of two divergent sequences whose product is a convergent sequence.

ii) Define limit superior and limit inferior of a sequence.

iii) Does the series $\sum_{n=1}^{\infty} \log\left(1+\frac{1}{n}\right)$ converge or diverge.

iv) Show that the series $\sum_{n=1}^{\infty} \frac{x^n}{n^n}$ is convergent for all $x \in R$.

v) Let $f(x) = \sin\left(\frac{1}{x}\right)$ for $(0 < x \leq 1)$

$f(0) = 2$

Is f Riemann integrable on [0, 1] ? Justify.

vi) For $n \in I$ let $f_n(x) = nx(1 - x^2)^n$ $(0 \leq x \leq 1)$. Show that $\{f_n\}_{n=1}^{\infty}$ converges to 0 on [0, 1].

vii) Prove that the series $\sum_{n=1}^{\infty} \frac{1}{n^p} \cos nx$ for p >1converges uniformly on $(-\infty, \infty)$.

2. Attempt **any two** of the following : **[10]**

i) If $\{a_n\}_{n=1}^{\infty}$ is a non increasing sequence of positive numbers and if $\sum_{n=1}^{\infty} a_n$ converges, then prove that $\lim_{n\to\infty} n\, a_n = 0$.

ii) If $\sum_{n=1}^{\infty} a_n$ converges absolutely, then prove that $\sum_{n=1}^{\infty} a_n$ converges. Give an example of a series which is convergent but not absolutely convergent.

iii) Test the convergence of $\sum_{n=1}^{\infty} \frac{3}{4+2^n}$.

P.T.O.

3. Attempt **any two** of the following : **[10]**

i) Let f be a bounded function on [a, b]. If 6* is any refinement of the subdivision 6 of [a, b], then prove that

$\cup[f;6^*] \leq \cup[f;6]$.

ii) If $F \in R$ [a, b] and a < c < b, then prove that $F \in R$ [a, c] and $F \in R$ [c, b].

Also prove that $\int_a^b f = \int_a^c f + \int_a^b f$.

iii) If $f(x) = x^2$ and for each $n \in I$, if $6_n = \left\{0, \frac{1}{n}, \frac{2}{n}, ..., \frac{n}{n}\right\}$ is a sub-division of [0, 1], then compute $\lim_{n\to\infty} \cup[f; 6_n]$.

4. Attempt **any one** of the following : **[10]**

i) a) Let $\{f_n\}_{n=1}^{\infty}$ be a sequence of real valued functions on a set E. Prove that $\{f_n\}_{n=1}^{\infty}$ is uniformly convergent on E to some function f if and only if given $\in > 0$ there exists $N \in I$ such that $|f_m(x) - f_n(x)| < \in$ $(m, n \geq N ; x \in E)$.

b) Does the series $\sum_{n=0}^{\infty} x(1-x)^n$ converge uniformly on [0, 1] ? Justify.

ii) a) Let $\sum_{k=1}^{\infty} u_k$ be a series of functions in R [a, b] which converges uniformly to f on [a, b]. Then prove that $f \in R$ [a, b] and also prove that $\int_a^b f(x)dx = \sum_{k=1}^{\infty} \int_a^b u_k(x)dx$.

b) Show that the sequence $\{f_n\}_{n=1}^{\infty}$, where $f_n(x) = x^n$, $x \in \left[0, \frac{1}{2}\right]$ converges uniformly on $\left[0, \frac{1}{2}\right]$.

[4017] – 305

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – V)
MT – 335 : Ordinary Differential Equations
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

i) Solve the differential equation $\frac{dy}{dx} = e^{x+y} + x^2 e^y$.

ii) Show that $y_1 = e^x$ and $y_2 = e^{-2x}$ are linearly independent solutions of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$.

iii) Show that $x = 2e^{4t}$, $y = 3e^{4t}$; and $x = e^{-t}$, $y = -e^{-t}$ are solutions of the homogeneous system $\frac{dx}{dt} = x + 2y$

$$\frac{dy}{dt} = 3x + 2y.$$

iv) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = 0$.

v) Find the orthogonal trajectories of the family $xy = c$.

vi) Find the integrating factor of the differential equation
$(2y^2 + 3xy - 2y + 6x)\,dx + x(x + 2y - 1)\,dy = 0$.

vii) Determine the nature of the point $x = 0$ of the equation $\frac{d^2y}{dx^2} + (\sin x)y = 0$.

P.T.O.

2. Attempt **any two** of the following : **10**

   i) Define the homogeneous differential of order one and explain the method of solving it.

   ii) Solve $\frac{dy}{dx} = \frac{x + y + 1}{x + y - 1}$.

   iii) Solve $\frac{dy}{dx} = x^3 - 2xy$; given x = 0, y = 1.

3. Attempt **any two** of the following : **10**

   i) If y_1 is a known solution and $y_2 = vy_1$ is another independent solution of $\frac{d^2y}{dx^2} + p(x)\frac{dy}{dx} + q(x)y = 0$ then determine the function v.

   ii) Solve the differential equation $\frac{d^2y}{dx^2} + 10\frac{dy}{dx} + 25y = 14e^{-5x}$ by the method of undetermined coefficients.

   iii) Find a particular solution of $\frac{d^2y}{dx^2} + 4y = \tan 2x$ by variation of parameters.

4. Attempt **any one** of the following : **10**

   i) a) Locate and classify singular points on the X-axis for the differential equation

   $$x^3(x-1)\frac{d^2y}{dx^2} - 2(x-1)\frac{dy}{dx} + 3xy = 0 .$$

   b) Express $\sin^{-1}x$ in the form of a power series $\sum_{n=0}^{\infty} a_n x^n$ by solving

   $$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}} .$$

ii) a) If W(t) is the Wronskian of the two solutions of the homogeneous system of differential equations, then prove that W(t) is either identically zero or nowhere zero on [a, b].

b) Solve the system of differential equations $\frac{dx}{dt} = x + y$

$$\frac{dy}{dt} = 4x - 2y .$$

[4017] – 306

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VI)
MT – 336 : Problem Course Based on MT – 334 and MT – 335
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory.***
*2) Figures to the **right** indicate **full** marks.*
*3) Answers to the **two** Sections should be written in **separate** answer books.*
4) Tie answer books of both Sections together.

SECTION – I

(Group Theory)

1. A) Attempt **any three** of the following : **6**

i) State whether true or false with justification. Any two groups of order 4 are isomorphic.

ii) If H and K are subgroups of an abelian group G and if $o(H) > \sqrt{o(G)}$, $o(K) > \sqrt{o(G)}$ then show that $H \cap K \neq (e)$.

iii) Show by giving an example that every proper subgroup of a noncyclic group may be cyclic.

iv) Find orbits and cycles in the permutation

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 3 & 4 & 5 & 1 & 6 & 7 & 9 & 8 \end{pmatrix}$$

B) Attempt **any one** of the following : **4**

i) Show that $G = \left\{ \begin{bmatrix} x & x \\ x & x \end{bmatrix} / x \neq 0, x \in \mathbb{R} \right\}$ is a group w.r.t. matrix multiplication.

ii) Let G be a group and $g \in G$ be any fixed element. Show that $\phi : G \to G$ defined by $\phi(x) = gxg^{-1}$ is an isomorphism.

P.T.O.

2. Attempt **any two** of the following : **10**

i) Suppose N and M are two normal subgroups of a group G and that $N \cap M = (e)$. Show that for any $n \in N$ and for any $m \in M$, nm = mn.

ii) If a and b are any two elements of a group G, then show that o (ab) = o(ba).

iii) Consider S_n for fixed $n \geq 2$ and let σ be a fixed odd permutation. Show that every odd permutation in S_n is a product of σ and some permutation in A_n.

SECTION – II

(Ordinary Differential Equations)

3. A) Attempt **any three** of the following : **6**

i) Solve $\frac{dy}{dx} = (4x + y)^2$.

ii) Show that the solutions $x = e^{4t}$, $y = e^{4t}$ and $x = e^{-2t}$, $y = -e^{-2t}$ of the following system $\frac{dx}{dt} = x + 3y$; $\frac{dy}{dt} = 3x + y$ are linearly independent.

iii) Show that $y = c_1 e^{2x} + c_2 xe^{2x}$ is a solution of $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 0$ on any interval.

iv) Solve $4\frac{d^2y}{dx^2} + 20\frac{dy}{dx} + 25y = 0$.

B) Attempt **any one** of the following : **4**

i) Find a particular solution of $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$ by variation of parameters method.

ii) The equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0$ has the solution $y_1 = x$. Find y_2 and the general solution.

4. Attempt **any two** of the following : **10**

i) Find the solutions of the initial value problem $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 5y = 0$ with y (0) = 3 and $\frac{dy}{dx}(0) = 11$.

ii) Solve the system of differential equations $\frac{dx}{dt} = -4x - y$

$\frac{dy}{dt} = x - 2y$

iii) Find a power series solution of the differential equation $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.

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[4017] – 307

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII)
MT – 337 : Elective (A) : Operations Research
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

i) Find a feasible region of the following LPP :

Maximize, $z = x_1 + 2x_2$

Subject to $x_1 = 2$,

$x_2 = 3$

$x_1, x_2 \geq 0$

ii) Define slack and surplus variables.

iii) Express the following LPP in equation form and determine one basic feasible solution

Maximize, $z = 2x_1 + 3x_2$

Subject to $x_1 + 3x_2 \leq 6$

$x_1, x_2 \geq 0.$

iv) Identify the direction of increase in z of the function Max $z = x_1 + 3x_2$.

v) Find the optimal value of the objective function for the following LPP by inspecting only its dual. (Do not solve the dual by simplex method)

Minimize $Z = 10x_1 + 4x_2 + 5x_3$

Subject to $5x_1 - 7x_2 + 3x_3 \geq 50$

$x_1, x_2, x_3 \geq 0$

P.T.O.

vi) What is degeneracy in a Transportation Problem ? How is it resolved ?

vii) Solve the following assignment problem for minimizing cost :

		Jobs			
		I	**II**	**III**	**IV**
Machines	**1**	10	2	4	3
	2	7	1	9	5
	3	0	8	6	2
	4	11	4	0	7

2. Attempt **any two** of the followings : **10**

i) A company produces two products A and B. The sales volume for A is atleast 80% of the total sales of both A and B. However, the company cannot sell more than 100 units of A per day. Both products use one raw material, of which the maximum daily availability is 240 lb. The usage rates of the raw material are 2 lb per unit of A and 4 lb per unit of B. The profit units for A and B are $ 20 and $ 50 respectively. Formulate the above problem as LPP.

ii) Following is a solution to a given transportation problem. Is the given solution optimal ? If not determine an optimal solution.

Source	**Destination**			
	I	II	III	IV
A	5	10	4 (10)	5
B	6 (20)	8	7	2 (5)
C	4 (5)	2 (10)	5 (5)	7

iii) By using simplex method show that the following LPP has an unbounded solution

Maximize $Z = 20x_1 + 10x_2 + x_3$

Subject to $3x_1 - 3x_2 + 5x_3 \leq 50$

$x_1 + x_3 \leq 10$

$x_1 - x_2 + 4x_3 \leq 20$

and $x_1, x_2, x_3 \geq 0$

3. Attempt **any two** of the followings : **10**

i) Use the North-West corner method to find the initial solution of the following transportation problem. Also find an optimum solution.

		Destinations			
		D_1	**D_2**	**D_3**	**Supply**
Source	**S_1**	0	2	1	6
	S_2	2	1	5	9
	S_3	2	4	3	5
Demand		5	5	10	

ii) Solve the following Assignment Problem for minimization of cost.

		Machine			
		W	**X**	**Y**	**Z**
Job	**A**	18	24	28	32
	B	8	13	17	19
	C	10	15	19	22

iii) Find IBFs of the following Transportation Problem for minimization of cost by VAM method.

		Destinations				
		D_1	**D_2**	**D_3**	**D_4**	**Supply**
Sources	**S_1**	19	30	50	10	7
	S_2	70	30	40	60	9
	S_3	40	8	70	20	18
	Demand	5	8	7	14	

4. Attempt **any one** of the followings : **10**

i) Solve the dual of the following LPP. Then find optimal solution of the primal from the solution of the dual.

Maximize $Z = x_1 + 5x_2$

Subject to $x_1 + 2x_2 \leq 3$

$-2x_1 + x_2 \leq -4$

$x_1, x_2 \geq 0$

ii) Solve the following LPP by Big-M-Method.

Minimize $Z = 4x_1 + x_2$

Subject to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0$

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[4017] – 309

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII)
(2008 Pattern) (New Course)
MT-337 : Elective – C :C-Programming – I

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*

1. Attempt **any five** of the following : **10**

i) Determine which of the following are valid identifiers.

a) 2nd b) for

ii) What is the difference between 23 and "23" ?

iii) Explain the meaning of following declaration int f(int a [ ], int n);

iv) Determine which of the following are valid integral constants : 0X23A, 23.0

v) Explain use of function getchar ( ).

vi) Find the value of the following expression.

$3\%5*5+4/3*3<4+5*2$

vii) Explain use of conditional operator.

2. Attempt **any two** of the following : **10**

i) Write a note on for-loop.

ii) Explain use of scanf function.

iii) Write a program to find sum of digits of an integer.

3. Attempt **any two** of the following : **10**

i) Write a program to find length of a string.

ii) Write a note on logical operators in C.

iii) Write a note on switch statement.

P.T.O.

4. Attempt **any one** of the following : **10**

i) a) Draw a flow chart to find maximum of three numbers.

b) Define a function to find less of two numbers.

ii) a) Write a note on two dimensional array.

b) Describe the output generated by the following C-program.

```
#include <stdio,h>
int main ( ) {
        int i, j ;
      for (i = 0 ; i < 5 ; i ++) {
         for (j = 0 ; j < i ; j ++)
                printf ("%4d", i*j) ;
         printf ("ln") ;
        }
      }
```

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[4017] – 311

T.Y.B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII) (2008 Pattern)
MT-337 : (Elective – E) : Combinatorics
(New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*

1. Attempt **any five** of the following : **10**
   i) How many ways are there to pick a man and a woman who are not husband and wife from a group of n married couples ?
   ii) How many arrangements of JUPITER are there with the vowels occurring in alphabetical order ?
   iii) How many arrangements of the letters in MISSISSIPPI are there in which M is followed immediately by an I ?
   iv) How many 7-digit numbers can be formed with the digits 3, 5 and 7 having three 3s, two 5s, and two 7s ?
   v) How many ways are there to distribute 20 identical sticks of red licorice and 15 identical sticks of black licorice among five children ?
   vi) Solve the recurrence relation :
   $a_n = 2a_{n-1}$, $a_0 = 6$
   vii) Among 600 families, 150 families have no children, 200 have only boys, and 200 have only girls. How many families have boy(s) and girls(s) ?

2. Attempt **any two** of the following : **10**
   i) How many even numbers in the range 100-999 have no repeated digits
   ii) How many integer solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 28$ with $x_i \geq i$, for i= 1, 2, 3, 4, 5 ?
   iii) If there are n objects, with r_1 of type 1, r_2 of type 2, ..., and r_m of type m, where $r_1 + r_2 + ... + r_m = n$, then prove that the number of arrangements of these n objects, is $\frac{n!}{r_1!r_2!...r_m!}$.

P.T.O.

3. Attempt **any two** of the following : **10**

   i) Give a combinatorial argument to show that $n^3 = \binom{n}{1} + 6\binom{n}{2} + 6\binom{n}{3}$.

   ii) How many n-digit ternary (0, 1, 2) sequences are there with at least one 0, at least one 1 and at least one 2 ?

   iii) Show that given any set of seven distinct integers, there must exist two integers in this set whose sum or difference is a multiple of 10.

4. Attempt **any one** of the following :

   i) a) Find a general solution of

   $a_n - 5a_{n-1} + 6\,a_{n-2} = 2 + 3n$ **5**

   b) If there are 48 different pairs of people who know each other at a party of 20 people, then show that some person has 4 or fever acquaintances. **5**

   ii) a) Find an solve a recurrence relation for the number of ways to make a pile of n chips using red, white and blue chips such that no. 2 red chips are together. **7**

   b) How many arrangements of INSTRUCTOR have 3 consecutive vowels ? **3**

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[4017] – 312

T.Y.B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII)
MT 337 Elective – F : Number Theory
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

i) If a, b are integers such that (a, b) = 1 then show that (a+b, a – b) = 1 or 2.

ii) Find the number of positive integers ≤ 3600 that are prime to 3600.

iii) Find the last digit in the ordinary decimal representation of 3^{60}.

iv) Prove that 11 is not a divisor of $4n^2+4$ for any integer n.

v) Give any two primes of which 2 is a quadratic residue.

vi) Prove that if ax + by = c is solvable then (a, b) = (a, b, c).

vii) Find the highest power of 3 dividing 100 !.

2. Attempt **any two** of the following : **10**

i) Given any integers a and b, with a > 0, show that there exist unique integers q and r such that $b = aq + r$, $0 \leq r < a$.

ii) Let a, b and m > 0 be given integers and g = (a, m) show that the congruence $ax \equiv b(\text{mod } m)$ has a solution if and only if g | b. Also, show that if this condition is met, then the solutions form an arithmetic progression with common difference $\frac{m}{g}$, giving g solutions (mod m).

iii) Find all integers that satisfy simultaneously

$x \equiv 2(\text{mod } 3)$

$x \equiv 3(\text{mod } 5)$

$x \equiv 2(\text{mod } 7)$

P.T.O.

3. Attempt **any two** of the following : **10**

i) Prove that $\delta(n) = \prod_{p^{\alpha} \| n} \left(\frac{P^{\alpha+1} - 1}{P - 1} \right)$ for every positive integer n.

ii) Show that the function $\mu(n)$ is multiplicative and $\sum_{d|n} \mu(d) = \begin{cases} 1 & \text{if } n = 1 \\ 0 & \text{if } n > 1 \end{cases}$.

iii) Find all integers x and y such that 147x + 258y = 369.

4. Attempt **any one** of the following : **10**

i) a) If p and q are distinct odd primes then show that

$$\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\left\lfloor \frac{(p-1)}{2} \right\rfloor \left\lfloor \frac{(q-1)}{2} \right\rfloor}.$$ **6**

b) If x, y, z is a primitive Pythagorean triple then show that one of the integers
x and y is even while the other is odd. **4**

ii) a) Let p denote a prime. Show that the congruence $x^2 \equiv -1 (\text{mod } p)$ has solutions if and only if p = 2 or $p \equiv 1 (\text{mod } 4)$. **6**

b) Find a positive integer n such that $\frac{n}{2}$ is a square, $\frac{n}{3}$ is a cube and $\frac{n}{5}$ is fifth power. **4**

[4017] – 315

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – II) (New) (2008 Pattern)
PH-332 : Classical Electrodynamics

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of log tables and calculator is* ***allowed****.*

1. Attempt **all** of the following (**1** mark **each**) : **10**

   a) Write the relation between $\overline{D}, \overline{E}$ and $\overline{P}$.

   b) State Gauss's law. Write the expression for integral form of Gauss's law.

   c) Define electric potential.

   d) State Biot-Savart's law.

   e) Define magnetic vector potential.

   f) Write an equation of continuity in magnetostatics.

   g) Write Faraday's law in integral form.

   h) What is Poynting vector ?

   i) Write any two Maxwell's equations in differential form in free space.

   j) Find the electric intensity at a point situated at a distance of 10 cm from point charge $q = 1.6 \times 10^{-12}$C.

2. Attempt **any two** :

   a) What is meant by an electrical image ? Write down the procedural step for solving electrostatic problems. **5**

   b) State and explain Biot-Savart's law. **5**

   c) Show that in a charge free non-conducting medium, Maxwell's equation lead to **5**

$$\nabla^2\overline{E} - \frac{1}{C^2}\cdot\frac{\partial^2\overline{E}}{\partial t^2} = 0$$

P.T.O.

3. Attempt **any two** :

a) Find the potential at the centre of square of side 0.5 m and having charges 2q, 3q, 4q, q at its corners **5**
$q = 1.6 \times 10^{-19}C$.

b) Find the magnitude of polarization $\vec{P}$ in a homogeneous and isotropic dielectric material with K = 3, if $D = 3 \times 10^{-7}$ c/m^2. **5**

c) Two long parallel wires separated by 1 cm in air carry current 50 ampere.
Find force on one meter length of wire $\left[\text{Given} : \frac{\mu_0}{4\pi} = 10^{-7}\,\text{Web/Amp.meter}\right]$. **5**

4. A) Attempt **any one** :

a) State and prove Poynting's theorem. **8**

b) Define potential energy of system of charges and obtain an expression for the potential energy of a system of charges. **8**

B) Attempt **any one** :

a) Calculate the velocity of propogation C in free space. **2**

Given $\mu_0 = 4\pi \times 10^{-7}\,\text{Wb/Am}$

$\epsilon_0 = 8.85 \times 10^{-12}\,C^2/Nm^2$

b) Find the magnitudes of $\overline{D}$ for a dielectric material in which
$E = 0.20 \times 10^6$ v/m and $\chi_e = 4$, $\epsilon_0 = 8.85 \times 10^{-12}\,C^2/Nm^2$. **2**

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[4017] – 319

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – VI) (2008 Pattern)
(Elective – I) (New)
PH-336 (A) : Astronomy and Astrophysics – I

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw ***neat*** *diagrams* ***wherever*** *necessary.*

1. Attempt **all** of the following (**1** mark **each**) : **10**
   a) What is meant by Chandrashekar limit ?
   b) Where do we use a coronagraph ?
   c) What is a solar ?
   d) Distinguish between Absolute and Apparent luminosity of a star.
   e) What is an Asteroid ?
   f) Where does Gravitational condensation occur ?
   g) What are Binary stars ?
   h) What is Bodes law used for ?
   i) What is the disadvantage of Newtonion Telescope ?
   j) What is the difference between Absorption and Emission spectra ?

2. Attempt **any two** :
   a) What is pulsars ? **5**
   b) How is Rotational period of a star obtained from its spectra ? **5**
   c) Write a short note on the Hubble Space Telescope. **5**

3. Attempt **any two** :
   a) What are the advantages of using Radio Telescopes ? **5**
   b) What is the difference between sydonic and sydereal time ? **5**
   c) Explain the proton-proton cycle in stars. **5**

4. A) Attempt **any one** :
      a) Describe the process of Radio Interferometry. **8**
      b) Describe the H-R diagram in detail. **8**
   B) Attempt **any one** :
      a) What is meant by Super Nova Explosion ? **2**
      b) Write a short note on Doppler effect in light. **2**

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P.T.O.

[4017] – 319

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – VI)
PH-336 (B) : Elements of Material Science
(Elective – I) (2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*

1. Attempt **all** of the following (**1** mark **each**) : **10**

i) Define the term 'Hardness'.

ii) Give any one purpose for which alloying is carried out.

iii) Calculate the resistance of an aluminium wire 101.6 cm long and 0.01 cm^2 in cross-section. (Given-resistivity of aluminium is 2.8×10^{-6} ohm. cm).

iv) Give any two importances of phase diagrams.

v) Give any two uses of polymers.

vi) What is a solid solution ?

vii) Give any two important characteristics of soft magnet.

viii) What are Ferrites ?

ix) What do you mean by elastic deformation ?

x) Write the Gibb's phase rule for two component or binary system.

2. Attempt **any two** of the following :

i) What is cross linked polymer structure ? Explain vulcanization of rubber. **5**

ii) State different types of point defects. Explain Frankel defect. **5**

iii) What do you mean by plastic deformation ? Explain various stages in the deformation process of polycrystalline aggregates. **5**

3. Attempt **any one** of the following :

i) The diffusivity of aluminium in copper at temperature 627°C is 2.4×10^{-17} m^2/s and at temperature 1127°C is 1.8×10^{-12} m^2/s. Determine the values of D_0 and E for this diffusion couple (Given $K = 13.8 \times 10^{-24}$ J/atom. °K). **5**

ii) A rod of copper should not be stressed to more that 140 N/m^2 in tension. What diameter is required if it is to carry a load of 4000 kg ? **5**

iii) Define CRSS. An aluminium crystal slips on [111] plane and in the [110] direction with a 400 psi stress applied in the [111] direction. What is the critical resolved shear stress ? **5**

4. A) Attempt **any one** of the following :

i) What are phase diagrams ? Explain the phase diagram of lead-tin system qualitatively. **8**

ii) What is AX-structure ? Discuss the AX-structure of CsCl type and NaCl type. **8**

B) Attempt **any one** of the following :

i) State the factors on which diffusivity depends. **2**

ii) What is linear polymer ? Define degree of polymerization. **2**

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[4017] – 319

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – VI) (Elective – I)
PH-336 (C) : Motion Picture Physics
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*

1. Attempt **all** of the following (**one** mark **each**) : **10**

a) Draw neat labelled diagram of B/W bromide paper.

b) What do you mean by large format ?

c) What is projection printing ?

d) List the essential parts of projector.

e) Mention different stages of intermittent of projector.

f) What is teleroomlens ?

g) Write C-41 process.

h) What is fast motion ?

i) What are camera movements ?

j) State types of perspective.

2. Attempt **any two** of the following :

a) Explain movie camera and its essential parts. **5**

b) How the following laboratory special effects are added ? Explain. **5**

i) Slow motion ii) Fast motion

c) Explain intermittent mechanism of movie camera. **5**

3. Attempt **any two** of the following :

a) Draw neat labelled diagram of T.L.R. camera. Explain coma with diagram. **5**

b) Explain normal and wide lenses in details. **5**

c) Explain shutter speed and Aperture. **5**

4. A) Attempt **any one** of the following :

a) Explain construction and working of S.L.R. camera in detail. **8**

b) Explain the lighting technique. Explain motor drive and camera accessories of movie camera. **8**

B) Attempt **any one** of the following :

a) What do you meant by projection lens ? **2**

b) State drive mechanism of projector. **2**

[4017] – 319

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – VI) (New) (2008 Pattern)
PH-336 (D) : Biophysics (Elective – I)

Time : 2 Hours Max. Marks : 40

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculators and log tables is* ***allowed****.*

1. Attempt **all** of the following (**each** of mark **1**) : **10**
   a) What is X-ray ?
   b) Define action potential.
   c) State any two function of protein.
   d) What is CMRR ?
   e) What is Heart rate ?
   f) Define conduction velocity.
   g) What is full form of SEM and TEM ?
   h) What is Redox couple ?
   i) State principle of colorimeter.
   j) What is Bond angles ?

2. Attempt **any two** of the following :
   a) Write a short note on Nuclear detector. **5**
   b) Explain how action potential of human body is measure using ECG. **5**
   c) Explain structural aspects of Amino-acid. **5**

3. Attempt **any two** of the following :
   a) With neat diagram, explain CIS and Trans configuration. **5**
   b) Explain various characteristics of biopotential amplifier. **5**
   c) Explain construction and working of SEM. **5**

4. A) Attempt **any one** :
      a) Explain construction and working of LVDT. **8**
      b) What is tranducer ? Explain any one type of tranducer. **8**

   B) Attempt **any one** :
      a) State nernst equation. **2**
      b) What is full form of ECG and EEG ? **2**

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T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS
PH-336 (E) : Medical Electronics (Elective – I)
(Paper – VI) (2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*

1. Attempt **all** of the following (**1** mark **each**) : **10**

a) Give any two features of medical instruments.

b) What is transducer ?

c) What are safety codes for electromedical instruments ?

d) What is Cardiac pacemaker ?

e) Define low pass filter.

f) Draw circuit symbol of OPAMP.

g) What is electrophoresis ?

h) State the uses of spectrophotometer.

i) What is the normal range of WBC count in human being ?

j) State various sources of radiation.

2. Attempt **any two** of the following :

a) Explain the principle, construction and working of inductive sensor. **5**

b) Write a note on microelectrodes. **5**

c) Explain the OPAMP as integrator with the help of a suitable diagram. **5**

3. Attempt **any two** of the following :

a) List the main types of blood tests. Explain any two in brief. **5**

b) What do you mean by Heart sound ? What is its significance ? **5**

c) Explain polarizable and non polarizable electrodes in brief. **5**

4. A) Attempt **any one** of the following :

a) What is plethysmography ? Explain the working of plethysmograph in brief. **8**

b) Explain the principle, construction and working of any one type of capacitive transducer. **8**

B) Attempt **any one** of the following :

a) What are the basic requirements of bio-potential amplifiers ? **2**

b) Define slew rate and CMRR. **2**

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[4017] – 321

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – II)
CH-332 : Inorganic Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Actual calculations ***must*** *be shown while solving the* ***problems****.*
4) Marks are ***reserved*** *for* ***neat*** *and labelled diagrams.*
5) ***Use*** *of log table and calculator is* ***allowed****.*
6) Atomic Number : H(1), Li(3), Cr(24), O(8), Fe(26), Co(27), Zn (30) Pt (78).

1. Answer the following : **10**
   i) What is the bond order in H_2^+ ion ?
   ii) How many unpaired electrons are present in MOs of Li_2 molecule ?
   iii) What is oxidation state of Pt in $[Pt(NH_3)_2Cl_2]$?
   iv) How many ions are responsible for molar conductance of $[Pt(NH_3)_6Cl_4$?
   v) Define Isomerism.
   vi) What is the EAN for the complexes of first transition series ?
   vii) Which complexes are called diagenetic ?
   viii) Which of the following system show Jahn Teller distortion ?
   a) d^0 b) d^2 c) d^5 d) d^9
   ix) How many electrons are present in t_{29} and eg orbitals of d^5 weak octahedral field ?
   x) What is the symmetry symbol for d-orbitals directed along the axes ?

2. A) Write note on **any two** of the following : **6**
   i) Ligand isomerism
   ii) Electroneutrality principle
   iii) Spectrochemical series.

   B) Answer **any two** of the following : **4**
   i) Calculate the EAN in the following complexes
   a) $[Cr(CO)_6]$ b) $[Fe(CN)_6]^{3-}$
   ii) Give comparison between atomic orbitals and molecular orbitals.
   iii) Write IUPAC names of the following complexes.
   a) $[Cr(en)_3]Cl_3$ b) $[Fe(CO)_5]$

P.T.O.

3. Answer **any two** of the following : **10**

   i) With the help of MO energy level diagram, explain the formation of O_2 molecule and comment how does bond order and magnetic property vary in O_2^+, O_2^-, O_2^{2-}.

   ii) Explain bonding, structure and magnetic properties of $[Zn(NH_3)_6]^{2+}$ ion on the basis of VBT.

   iii) Draw MO energy level diagram of $[Ti(H_2O)_6]^{3+}$ without π bonding.

4. A) For the $[Cr(H_2O)_6]^{2+}$ and $[Cr(CN)_6]^{4-}$ ion has Δ_0 values are 17830 cm^{-1} and 26280 cm^{-1} respectively. The pairing energy 'P' is 23520 cm^{-1}. State which complex is high spin and low spin. Calculate magnetic moment of each complex using splitting diagram. **6**

   OR

   A) Explain on the basis of MO theory, NO^+ has a stronger bond than NO itself. Comment on its magnetic properties. **6**

   B) What are the postulates of Werner's theory ? **4**

   OR

   B) Write note on charge transfer spectra. **4**

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[4017] – 325

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – VI)
CH-336 (A) : Nuclear Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Draw*** *the diagrams* ***whenever*** *necessary.*
4) ***Use*** *of log tables and calculator is* ***allowed****.*

1. Answer the following : **10**

a) Define binding energy and mean binding energy.

b) The heaviest stable element in nature is _____

A) $^{209}_{83}Bi$ B) $^{208}_{82}Pb$ C) $^{140}_{58}Ce$ D) $^{235}_{92}U$

c) Define nuclear isomers with suitable examples.

d) State the merits of liquid drop model.

e) Show that $t_{½} = \frac{0.693}{\lambda}$.

f) Which are the two alpha active nuclides ?

g) What is reaction cross section ?

h) Complete the following nuclear reaction

$^{9}_{4}Be + ... \rightarrow {}^{12}_{6}C + {}^{1}_{0}n$

i) Define range of an alpha particle. What is the range of alpha particle in air ?

j) What are the applications of semi-empirical mass equation ?

2. A) Attempt **any two** of the following : **6**

a) Define photonuclear reactions. What are the different types of photonuclear reactions ?

b) Explain different types of quarks with reference mass and charge.

c) Write short note on nuclear isomerism and isomeric transition.

P.T.O.

B) Answer **any two** of the following : **4**

a) Calculate the binding energy of $^{4}_{2}He$

Given : Mass of proton = 1.008 amu

Mass of neutron = 1.0078 amu

Mass of ^{4}He = 4.0026 amu

b) Discuss the nuclear stability on the basis of N/Z ratio.

c) Define :

1) Decay constant and

2) Average life

3. Answer **any two** of the following : **10**

a) Explain different types of radioactive decay processes with suitable examples.

b) State and explain semi-empirical mass equation.

c) Explain Bethe's notation. What are different types nuclear reactions ?

4. A) Explain Fermi theory of beta decay. **6**

OR

A) Give salient features of shell model. What are the merits and limitations of the shell model ? **6**

B) Write a note on thermonuclear reactions. **4**

OR

B) Polonium has a half life of 140 days. How much time will be required so that activity of it falls to 5% of its original activity ? **4**

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[4017] – 325

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – VI)
CH-336 (B) : Polymer Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Draw*** *the diagrams* ***whenever*** *necessary.*
4) ***Use*** *of log tables and calculator is* ***allowed****.*

1. Answer the following : **10**

i) Define the term co-polymer.

ii) Draw the structure of polyurethane polymer.

iii) The process of vulcanization invented by _____

iv) Calculate the molecular weight of polypropylene whose DP value is 600.

v) State whether the following statement is true or false :
'Phenol-formaldehyde is the thermoplastic'.

vi) Give two important applications of polycarbonate.

vii) Write the correct structure of the polymer whose IUPAC name is dicyclohexyl-silane-diol.

viii) Name any two commonly used flame retardants.

ix) Define the term-carbowax.

x) Draw the structures of following monomers,
a) Vinyl acetate b) Chloroprene

2. A) Explain the following **(any 3)** : **6**

i) Polymeric articles are widely used in day todays life.

ii) Fillers are often used for making plastic articles.

iii) Plastisizers are added to plastic during the processing.

iv) Fevicol or Unicol is used in plywood industries.

B) How will you distinguish the following **(any 2)** : **4**

i) Organic and Inorganic polymers.

ii) Bulk polymerisation and Melt polymerisation.

iii) Thermoplastics and thermosetting polymers.

3. Answer **any two** of the following : **10**

i) Give a full account of suspension polymerisation.

ii) Discuss in detail the cure reactions of polymers.

iii) Write a detail note on 'End Group Analysis' for determination of molecular weight of polymers.

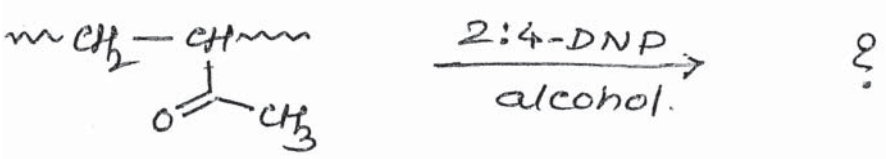
4. A) Attempt **any two** of the following : **6**

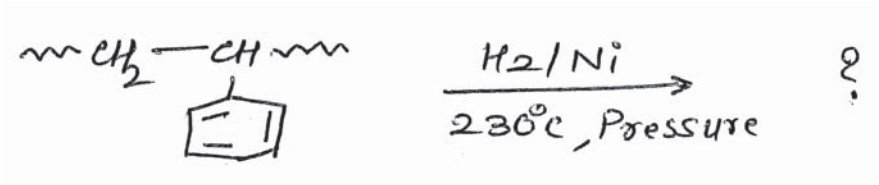
i) In certain experiment 2.110 g of polymer sample required 10.7 ml of 0.125 N alcoholic KOH solution for neutralization; calculate the molecular weight of given polymer sample. (functionality of polymer is 2)

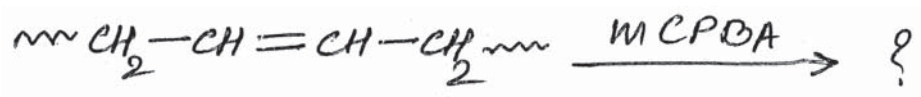
ii) Write a note on - epoxidation of polymers.

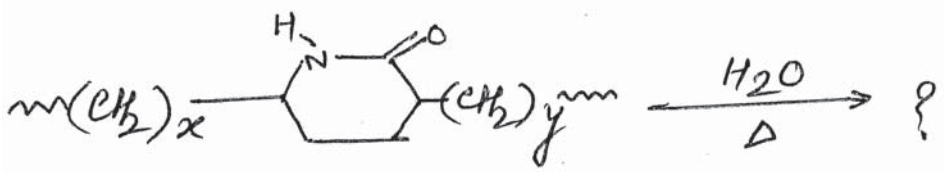
iii) Give the brief account of 'Interfacial Condensation'.

B) Complete the following polymer reactions. **4**

i) 

ii) 

iii) 

iv) 

[4017] – 325

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – VI)
Biochemistry
CH-336 (C) : Introduction to Biochemistry and Molecular Biology
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Draw*** *neat diagrams* ***wherever*** *necessary.*

I. Answer the following : **10**
1) Name two fat soluble vitamins.
2) Give examples of two steroid hormones.
3) Define the term Km.
4) What are zwitter ions ?
5) List out two epimers of glucose.
6) What are heterodisaccharides ? Give example.
7) Define the term saponification number.
8) Write MM equation.
9) What are coenzymes ? Give one example.
10) Write the structure of serine.

II. A) Attempt **any two** : **6**
1) List out the functions of proteins.
2) Write note on functions and deficiency disorder of Vitamin C.
3) What are the forces that stabilise the tertiary structure of proteins ? Give their significance.

B) Give the structures of the following **(any two)** : **4**
1) Maltose
2) Lecithin
3) Gly-Ala-Val.

III. Answer **any two** of the following : **10**
1) Classify Carbohydrates with suitable examples.
2) Explain the principle, procedure and applications of gel filtration.
3) Differentiate between Prokaryotes and Eukaryotes with example.

IV. Answer the following :
A) Elaborate on the factors that affect enzyme activity. **6**

OR

A) Explain the reactions of aminoacid with Sanger's reagent, Dansyl chloride and Dabsyl chloride.

B) Write a note on CAMP as second messenger. **4**

OR

What are phospholipids ? Give their biological significance.

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[4017] – 325

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – VI)
CH-336 (D) : Environmental Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*

1. Answer the following in short. **10**
   i) Define 'Sink'.
   ii) What do you mean by Acid mine drainage.
   iii) Define 'primary pollutants'.
   iv) Name the major components of the atmosphere.
   v) What is relationship between ppm and ppb ?
   vi) What is function of Tetra Ethyl Lead (TEL) ?
   vii) What is p^E ?
   viii) What are carcinogens ?
   ix) Explain the term 'Denitrification'.
   x) Mention the chemical causing Bhopal gas disaster.

2. a) Attempt **any two** of the following : **6**
      i) Thermal pollution. Explain.
      ii) Oil pollution. Explain.
      iii) Explain effects of CO pollution on human.

   b) Write short notes on **(any two)** : **4**
      i) Toxic chemicals in soil.
      ii) Green house effect.
      iii) Earthquakes.

3. Attempt **any two** of the following : **10**
   i) What is chemical speciation ? Describe the chemical speciation of pb (lead).
   ii) Explain 'Eutrophication'.
   iii) Discuss radioactive pollution.

4. a) Give a short account of particulate matter in atmosphere.
      OR
      Describe any one method of estimation of D.O. **6**

   b) Answer the following **(any one)** : **4**
      i) Discuss acid rain with its effects.
      ii) TCDD accident at Saveso, Italy.

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[4017] – 325

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – VI)
CH-336 (E) : Agriculture Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Draw*** *the diagrams* ***wherever*** *necessary.*

1. Answer the following : **10**

a) Who is father of Soil Chemistry ?

b) Define soil texture.

c) What is the need of soil testing ?

d) Define micronutrients.

e) Classify manures.

f) Differentiate between attractants and repellents.

g) Draw flowsheet diagram of outdoor vermi composting.

h) Give different sources of water.

i) What is nitrification ?

j) Define electrical conductivity of soil.

2. A) Answer **any two** : **6**

1) What are objectives of agriculture chemistry ?

2) What is lime requirement ? What is the effect of lime on acid soils ?

3) How does fixation of phosphorous takes place in acid soil ?

B) Attempt **any two** : **4**

1) Give relation between agro-chemistry and other branches of science.

2) State pH of saline, non-saline, neutral and calcarious soil.

3) Write a note on RSC (Residual Sodium Carbonate).

3. Attempt **any two** : **10**

A) Explain the action of urea, ammonium sulphate and nitrogen on soil.

B) Write an essay on soil structure.

C) i) Explain insecticidal activity of Carboryl and Baygon.

ii) What are fumigents ? Explain with examples.

4. A) Answer **any two** : **6**

1) State importance of buffer action in soil fertility.

2) Write a note on quality of irrigation water.

3) Explain the role and deficiency symptoms of potassium.

B) Attempt **any two** : **4**

1) Write a note on Azofication.

2) What are advantages of mix fertilizers ?

3) Write note on cation exchange in soil.

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[4017] – 326

T.Y. B.Sc. (Semester – III) Examination, 2011
BOTANY (Paper – I) (New Course) (2008 Pattern)
BO-331 : Algae, Fungi and Bryophyta

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Draw **neat** labelled diagrams **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Answer the following : **10**

   a) Give one example of Xanthophyta.

   b) Give application of mycorrihzae in Agriculture.

   c) Give any two distinguishing characters of Anthoceros.

   d) Enlist types of sexual reproduction in chlorophyta.

   e) Give example of Ascomycetes.

   f) Give types of rhizoids in Marchantia.

   g) Give any two general characters of zygomycetes.

   h) Give any two general character of charophyta.

   i) Give example of phaeophyta.

   j) Give any two characters of Bryophyta.

2. Attempt **any two** of the following : **10**

   a) Describe structure of fruiting body in Basidiomycetes.

   b) Sketch, label and describe structure of thallus in Marchantia.

   c) Give outline classification of algae as per G. M. Smith (1955).

P.T.O.

3. Write notes on **any two** : **10**

   a) Thallus structure of Anthoceros.

   b) Reproduction in Pyrophyta.

   c) General characters of Bryopsida.

4. Give thallus structure, reproduction and economic importance of Chara. **10**

   OR

   Sketch, label and describe any two reproductive stages in Puccinia. **10**

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[4017] – 332

T.Y.B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – I)
Zy-331 : General Zoology (2008 Pattern)
(New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *labelled diagrams must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**
   1) What is neoteny ?
   2) Define torsion.
   3) Give scientific name of garden lizard.
   4) What is homodont dentition ?
   5) Define hibernation.
   6) Enlist sense organs in calotes.
   7) State habitat of Pila.
   8) What is optic chaisma ?
   9) Define metanephric kidney.
   10) Give importance of Epitaenia in Pila.

2. Attempt **any two** of the following : **10**
   i) Describe external characters of Pila.
   ii) Describe habits and habitat of Calotes.
   iii) Describe accessory respiratory organs in fishes.

P.T.O.

3. Write notes on **any two** of the following : **10**
   a) Larval forms of crustacea
   b) Significance of teeth in mammals
   c) Scales in calotes.
   d) Aortic arches in amphibians.

4. Describe Nervous system of Pila. **10**

OR

Discuss the affinities and systematic position of Balanoglossus.

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[4017] – 334

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – III)
ZY – 333 : Biological Chemistry
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *labelled diagram must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

1) Define buffer.

2) Define Isoenzyme.

3) What are allosteric enzymes ?

4) What are oxidoreductases ?

5) Name the protein possessing β pleated structure.

6) What is antiegg white injury factor ?

7) What are cephalins ?

8) Give example of competitive enzyme inhibition.

9) Give biological significance of Fe.

10) Name the symmetric amino acid.

2. Attempt **any two** of the following : **10**

i) Explain clinical significance of lipids.

ii) Isomerism in carbohydrates.

iii) Classification of enzymes.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Oxidative rancidity

   b) Mutarotation

   c) Zwitter-ion

   d) Fat soluble vitamins.

4. What are proteins ? Describe primary and secondary structure of proteins and add a note on biological significance of proteins. **10**

   OR

   Derive Henderson-Hasselbalch equation and add a note on biological significance of buffers.

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[4017] – 338

T.Y.B.Sc. (Semester – III) Examination, 2011
GEOLOGY (Paper – I)
GL-331 : Mineralogy
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Neat** diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2/3** lines : **10**

a) Define 'Refractive Index' of a mineral.

b) What is uniaxial mineral ?

c) Define the term relief.

d) What are precious and semiprecious stones ?

e) What is halite ?

f) What are accessory plates ?

g) Give the composition of sphalerite.

h) What is optic axial angle ?

i) What are refractory minerals ?

j) What is optic normal ?

2. Write notes on (**any two**) : **10**

a) Hess triangular diagram

b) Properties and uses of baryte

c) Sign of elongation.

P.T.O.

3. Explain the following (**any two**) : **10**

   a) Composition and paragenesis of corundum.

   b) Physical properties and uses of haematite.

   c) Geological and geographical distribution of magnesite as non metallic mineral deposit.

4. Give silicate structure, chemical composition, physical and optical properties, paragenesis and alteration products of GARNET mineral group OR OLIVINE mineral group. **10**

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[4017] – 342

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOLOGY (Paper – V) (New)
GL – 335 : Precambrian Stratigraphy of India
(2008 Pattern)

Time : 2 Hours Total Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Neat** diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2/3** lines : **10**

a) Name the physiographic divisions of India.

b) Give any two names of Precambrian mobile belts of India.

c) What are Khondalites ?

d) Name the subdivisions of Cuddapah supergroup.

e) Give the tectono-geomorphic subdivisions of Himalayas.

f) Give subdivisions of Archaean Eon.

g) On which craton Erinpura Granite is found ?

h) Where are Dalma volcanics found ?

i) Name any two lower Purana basins.

j) What is Eparchaean unconformity ?

P.T.O.

2. Write notes on **any two** : **10**

   a) Global Precambrian history

   b) Simla group

   c) Charnockites.

3. Write notes on **any two** : **10**

   a) Stratigraphic succession of Delhi supergroup.

   b) Economic importance of rocks found in Singhbhum Craton.

   c) Difference between Sargurs and Dharwars.

4. Give the geographic distribution, classification with stratigraphic succession, lithology and economic importance of

   VINDHYAN SUPERGROUP

   OR

   DONGARGARH SUPERGROUP. **10**

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[4017] – 343

T.Y.B.Sc. (Semester – III) Examination, 2011
GEOLOGY (Paper – VI) (2008 Pattern)
GL-336 : Applied Geology – I (New)
Field Geology, Remote Sensing

Time : 2 Hours | Total Marks : 40

N.B. *: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Neat** diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2/3** lines : **10**

a) What is gray body ?

b) What is Nadir point ?

c) What is lineament ?

d) What is an outcrop ?

e) What is chilled contact ?

f) What is area feature ?

g) State two types of data in GIS.

h) What is vector data model ?

i) What does LIDAR stand for ?

j) What is hyperspectral scanner ?

2. Answer **any two** of the following : **10**

a) Describe aims and objectives of the fieldwork.

b) Briefly explain LANDSAT-6 satellite.

c) Write an account of geostationary satellites.

P.T.O.

3. Answer **any two** of the following : **10**

   a) Explain dendritic drainage pattern and its significance.

   b) Explain atmospheric scattering.

   c) What are photogeologic characters of shale ?

4. What do you mean by sensors ? What are two main types of sensors ? Give brief account of sensors used in remote sensing. **10**

OR

4. What do you mean by global positioning system ? Explain the working of global positioning system. **10**

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[4017] – 344

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – I)
ST-331 : Distribution Theory – I
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of scientific calculator and statistical tables is **allowed**.*
*4) Symbols and abbreviations have their **usual** meanings.*

1. Attempt **each** of the following :

a) Choose the correct alternative in **each** of the following : **(1 each)**

i) If $X \sim \beta_1(m, n)$, then the mean of X is

A) $\frac{m}{n-1}$ B) $\frac{m}{m+n}$ C) $\frac{n}{m+n}$ D) $\frac{n}{n-1}$

ii) The probability density function (p.d.f.) of the n^{th} order statistic $X_{(n)}$ is

A) $n[1-F(x)]^{n-1} \cdot f(x)$ B) $n[1-F(x)]^{n} \cdot f(x)$

C) $n[F(x)]^{n} \cdot f(x)$ D) $n[F(x)]^{n-1} \cdot f(x)$

iii) If $(X_1, X_2, ..., X_8) \sim MD(n, p_1, p_2, ..., p_8)$ then the rank of variance covariance matrix is

A) 7 B) 8 C) 9 D) 10

iv) A random variable (r.v.) X has $E(X) = 3$ and $E(X^2) = 13$ then upper bound for $P[|X-3|>8]$ is

A) $\frac{3}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{16}$ D) $\frac{1}{4}$

P.T.O.

b) State whether **each** of the following statements is **true** or **false** : **(1 each)**

i) If $X \sim \beta_1(9, 8)$ then the distribution of $\frac{X}{1-X}$ is $\beta_2(9, 8)$.

ii) If $(X_1, X_2, X_3) \sim MD(20, 0.3, 0.5, 0.2)$ then mean of X_2 is 6.

c) i) Obtain hazard rate of Weibull distribution with parametes α and β. **1**

ii) State Chebychev's theorem. **1**

d) i) State weak law of large numbers (WLLN). for i.i.d. random variables. **1**

ii) Define order statistics. **1**

2. Attempt **any two** of the following : **(5 each)**

a) Let $X \sim W(\alpha, \beta)$. Obtain mean and variance of the distribution of X.

b) Let $(X_1, X_2, ..., X_k) \sim MD(n, p_1, p_2, ..., p_k)$. Obtain the moment generating function of $(X_1, X_2, ..., X_k)$ and hence find variance of X_i.

c) Let $X \sim \beta_2(m, n)$. Obtain mean and variance of the distribution of X.

3. Attempt **any two** of the following :

a) State and prove Chebychev's inequality for continuous random variable. **5**

b) i) Let X_i denote the number of meteorities that collide with a test satellite during the i^{th} orbit. Let $S = \sum_{i=1}^{n} X_i$. Assume that the X_i's are i.i.d. Poisson r.v.s. with mean 4, if n = 100 find $P(S_{100} > 440)$ by using central limit theorem. **3**

ii) Let $X \sim W(\alpha = 5, \beta = 3)$. Obtain the distribution of 5X. **2**

c) Let X and Y be two independent $\beta_1(1, 1)$ variates. Obtain the distribution of $\frac{X}{Y}$. **5**

4. Attempt **any one** of the following :

a) i) State and prove central limit theorem for i.i.d. r.v.s. **6**

ii) Let $X_{(1)}, X_{(2)}, X_{(3)}, X_{(4)}$ be order statistics of random sample size 4 from a distribution having p.d.f.

$$f(x) = 2x \quad , \quad 0 < x < 1$$
$$= 0 \quad , \quad \text{otherwise}$$

Compute $P\left(\frac{1}{2} < X_{(3)}\right)$. **4**

b) i) Obtain the probability density function of i^{th} order statistic for a random sample size n from a continuous distribution. **6**

ii) Ten independent observations are to be made on a random variable X having following p.d.f.

$$f(x) = \frac{1}{3} \quad , \quad 1 < X < 4$$
$$= 0 \quad , \quad \text{otherwise}$$

Find the probability that 3 observations will be less than mean, 3 observations will be greater than mean but less than 3.5 and remaining observations will be more than 3.5. **4**

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[4017] – 357

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY (Paper – II) (2008 Pattern) (New Course)
MB-332 : Genetics and Molecular Biology – I

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Draw **neat** labelled diagrams **wherever** necessary.*

I. Answer the following : **10**

A) Choose the correct answer.

i) Replication of DNA in E.coli begins at Ori _____
a) A b) R c) C d) V

ii) During replication, DNA un winds at _____bp repeats.
a) 9 b) 11 c) 13 d) 15

iii) (2n+1) chromosomal aberration is called _____
a) Monosomy b) Disomy c) Trisomy d) Nullisomy

iv) In Eukaryotic Cell Cycle, DNA replication occurs in _____ phase.
a) M b) G_1 c) S d) G_2

v) N protein acts as a _____ in λ phage lytic cycle.
a) Inducer b) Repressor c) Attenuator d) Terminator

B) i) Calculate the burst size if 3000 virions are liberated from 15 infected bacteria.

ii) If the sequence of bases on the coding strand is 3′GCCTTAGCA 5′, what will be the sequence of bases on the corresponding mRNA ?

C) State whether the following statements are **True** or **False** :

i) The $I^+P^+O^+Z^+Y^-$ genotype of E.coli does not synthesize β -galactoside permease.

ii) The pribnow box is often referred to as –10 sequence in procaryotes.

iii) T_2h bacteriophages are conditional lethal mutants.

P.T.O.

II. Diagrammatically represent **any two** of the following : **10**

a) Initiation of bacterial translation.

b) One step growth curve of bacteriophage.

c) Rho dependant and Rho independent termination of transcription of Bacterial DNA.

III. Answer **any two** of the following : **10**

a) Compare and contrast transcription and DNA replication in Procaryotes.

b) Explain photoreactivation repair mechanism of UV damaged DNA.

c) Describe the host range mutants of bacteriophages.

IV. Answer **any one** of the following : **10**

a) Explain the structure and working of Lac operon in E.coli.

b) What is parasexual cycle ? Describe mitotic crossing and its significance in mapping the chromosome of Aspergillus nidulans.

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[4017] – 370

T.Y. B.Sc. (Semester – III) Examination, 2011

DEFENCE AND STRATEGIC STUDIES (Paper – III)

DS : 333 : Study of Disaster

(2008 Pattern) New

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer in **two** to **four** sentences : **16**

   1) State the meaning of Disaster.

   2) State the meaning of War.

   3) Write the meaning of Manmade Disaster.

   4) What do you mean by Tsunami ?

   5) What is Natural Disaster ?

   6) State the meaning of Environmental Disaster.

   7) What do you mean by Biological War ?

   8) What do you mean by Population Burden ?

2. Answer in **8** to **10** sentences (**any two**) : **8**

   1) Explain the nature and types of Manmade Disaster.

   2) Discuss the effects of Environmental Disaster.

   3) Write the characteristic of Natural Disaster.

P.T.O.

3. Write short notes on (**any two**) : **8**

   1) Terrorism

   2) Global Warming

   3) Nuclear War and Disaster.

4. Answer in **16** to **20** sentences (**any two**) : **8**

   1) Why study of Disaster is necessary.

   2) Discuss the relationship between War and Disaster.

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[4017] – 374

T.Y.B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 (A) : Military Sociology (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

***N.B.**: i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicate **marks**.*

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define 'Military'.
   2) Define 'Sociology'.
   3) Define 'War'.
   4) What is meant by Soldiering ?
   5) Define 'Combatant'.
   6) Who are known as airwarrior in India ?
   7) What is 'Value' ?
   8) What is 'One class army' ?

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Describe military as a Social Institution.
   2) What is the Social View of War in India ?
   3) How discipline is accomplished in Armed Forces ?

3. Write short notes on (**any two**) : **8**
   1) Chetwodean Motto
   2) Moskos Analysis
   3) Traditions of Gallantry in India.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the features of Indian culture and its impact on military and society.
   2) Discuss the image of armed forces in India.

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P.T.O.

[4017] – 374

T.Y.B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 (B) : Defence Journalism (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

***N.B.**: i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicate **marks**.*

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define 'Defence'.
   2) Define 'Journalism'.
   3) What is 'Defence Journalism' ?
   4) Define 'Army'.
   5) Define 'Navy'.
   6) Define 'Air Force'.
   7) What in Inter Service Organisation ?
   8) Write the role of NDA (Khadakwasla).

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Write the role of Media in image building of Armed Forces.
   2) Write the scope of Defence Journalism.
   3) Describe the Hurdles in Defence Journalism.

3. Write short notes on (**any two**) : **8**
   1) Media as a Force Multiplier
   2) Military-Media Relationship
   3) Ingredients in Defence Journalism.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Describe the structure of defence establishment in India.
   2) What essential informations are needed to defence journalist ? Explain.

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[4017] – 374

T.Y.B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – VII)
DS-337 (C) : Defence Preparedness of India (I) (New Course) (Optional)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) Answer **all** questions.*
*2) Figures to the **right** indicate **full** marks.*

1. Answer in **two** to **four** sentences : **16**
   1) State the meaning of Geo-Political Evolution.
   2) What do you mean by war potential ?
   3) Define strategic culture.
   4) State the meaning of Defence and Development.
   5) Define Maritime Security.
   6) What do you mean by perspective planning ?
   7) Define Development.
   8) State the meaning of actual allocation of Budget.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain Defence Preparedness.
   2) Describe India's Land Border.
   3) Discuss recent Political Development between India-China.

3. Write short notes on (**any two**) : **8**
   1) Defence and Development.
   2) Economic condition of India.
   3) Status of India's Strategic Culture.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Write a note on India's Military Power.
   2) Discuss India's Foreign Policy Vis-a-Vis South Asian Countries.

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[4017] – 377

T.Y. B.Sc. (Semester – III) Examination, 2011
ENVIRONMENTAL SCIENCES (New Course) (Paper – I)
ENV – 301 : Terrestrial Ecosystems and Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *and labeled diagrams must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following in **1-2** lines **each** : **10**

a) Define hotspots.

b) What is ecotone ?

c) Define biome.

d) What is asthetic value ?

e) Define eco-tourism.

f) What is carbon pool ?

g) What is GIS ?

h) Define ecological restoration.

i) What is sustainable management ?

j) What is meant by Savanna ?

2. Write a short note on **(any two)** : **10**

a) Species interaction.

b) Importance of biogeochemical cycle.

c) Line and belt transect method.

P.T.O.

3. Answer **any two** from the following : **10**

   a) Explain concept of keystone species with suitable examples.

   b) Explain restoration of surface mined lands.

   c) Explain the impact of tourism.

4. Attempt **any one** from the following : **10**

   a) Discuss the concept and types of habitat restoration.

   b) Explain the desert and grassland biome with reference community structure and function.

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[4017] – 378

T.Y. B.Sc. (Semester – III) Examination, 2011
ENVIRONMENTAL SCIENCES
ENV – 302 : Wildlife Biology (Paper – II) (2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following in **1-2** lines **each** : **10**

a) Name any 2 protected animal species of India.

b) What are Wetlands ? Give example.

c) Enumerate any 2 characteristics of mammals.

d) Enumerate any 2 characteristics of gymnosperms.

e) Write 2 examples of food chain in a desert ecosystem.

f) What is meant by lotic water ecosystem ? Give example.

g) Enlist any 2 tropical forest types.

h) Mention difference between centipede and millipede.

i) What are lithophytic algae ?

j) Enumerate any 2 economic importance of insects.

2. Write a short note on (**any two**) : **10**

a) Conservation of genetic diversity.

b) Quadrat method.

c) Agricultural landscape as a wildlife habitat.

P.T.O.

3. Answer **any two** from the following : **10**

   a) What are diversity indices ? Discuss any two.

   b) How are developmental projects a threat to wildlife ? Explain with 2 examples.

   c) Discuss transect method for bird assessment.

4. Attempt **any one** of the following : **10**

   a) Describe in detail any 5 aquatic habitats. Give examples for each.

   b) Describe the characteristics of any 5 Arthropods and their respective habitat type.

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[4017] – 382

T.Y. B.Sc. (Semester – III) (Environmental Sciences) Examination, 2011
ENV 306 : ENVIRONMENTAL BIOTECHNOLOGY – I (New Course)
(Paper – VI) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following in **1-2** lines **each** : **10**

a) Define Biopesticides.

b) What do you understand by composting ?

c) Write two biological energy resources.

d) State two examples of GMOs.

e) What do you understand by aerial microbes ?

f) Write two example of abiotic microbes.

g) State any two chemical characteristics of Vermi compost.

h) Write any two types of biofertilizers.

i) Define syntrophism in soil.

j) Define combusion of biomass.

2. Write a short note on (**any two**) : **10**

a) Scope of environmental biotechnology.

b) Micropropagation Technology.

c) Biofuels as an alternative non fossil energy resources.

P.T.O.

3. Answer **any two** from the following : **10**

   a) Discuss biosafety regulations for GMOs.

   b) Explain the use of Agrobased-solid wastes as biofertilizers.

   c) Describe the life cycle of earthwork.

4. Attempt **any one** of the following : **10**

   a) Describe in detail pesticidal activities of Neem with a note on unique multifactor action of Neem bitters.

   b) Discuss in detail collection and enumeration strategies of aerial microbes.

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[4017] – 386

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONIC EQUIPMENT & MAINTENANCE
(Vocational) – (Paper – V)
Electronic Equipment Troubleshooting and Repairs
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of logtables, calculators is **allowed**.*

1. Answer the following : **(3×4=12)**

a) Answer the following : **(4×1=4)**

i) Why is an inductance called 'wattless' component ?

ii) Why should repairing be followed by specification checking ?

iii) State any two faults in digital circuits.

iv) What is meant by the term 'preventive maintenance' ?

b) Answer the following : **(2×2=4)**

i) In an op-amp non-inverting amplifier R_f = 10KΩ and R_1 = 2 KΩ. What is its output if Vin = – 1.2 volt ? What will be its output if R_1 is open circuit ?

ii) How many checks will be needed in input to output method if number of stages is 15 ?

c) Comment on the following : **(2×2=4)**

i) Users complaint and report is important in troubleshooting.

ii) Poor design is one of the causes of equipment failure.

2. Answer **any two** of the following : **(2×4=8)**

a) Explain possible faults in resistors.

b) Explain testing of RAM and ROM.

c) Discuss common faults in an SMPS.

P.T.O.

3. Answer **any two** of the following : **(2×4=8)**

   a) Explain following steps in troubleshooting.

      – Physical inspection

      – Identification of fault.

   b) Explain faults in op-amps and op-amp application circuits.

   c) Discuss the problems in troubleshooting LSI based systems.

4. Answer **any two** of the following : **(2×6=12)**

   a) Discuss following faults in a CRO and their remedies.

      i) No spot

      ii) Display does not become stable

      iii) No control on intensity.

   b) Give troubleshooting procedure and typical faults in a DMM.

   c) Explain the working of following test equipment for digital circuits

      i) Logic probe

      ii) Logic current tracer.

OR

4. Answer the following : **(3×4=12)**

   a) Discuss troubleshooting of a power supply unit. What are hot and cold tests ?

   b) In a zener regulator V_{indc} = 20 volt, Rs = 2 KΩ, Vz = 10 volt and R_L = 8 KΩ. Find voltage across R_L under following conditions :

      – Zener diode open

      – Resistor R_s short

      – Resistor R_s open

      – Zener diode short.

   c) For a 3- input AND gate (Inputs : lines 1, 2 and 3 and output : line 4) construct a truth table for different faults. Hence obtain the specific test vectors for faults in this AND gate.

[4017] – 395

T.Y. B.Sc. (Semester – III) Examination, 2011
(Vocational) COMPUTER HARDWARE AND NETWORK ADMINISTRATION
Paper – VI : Network Concepts – I (New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

1. Attempt all in **one/two** sentences : **(1×10=10)**
   1) What does SMTP stand for ?
   2) What is a MAC address ?
   3) Give port nos for : DHCP and POP3.
   4) Name any two client Operating Systems.
   5) Which two network commands determine the network connectivity between two sites A and B ?
   6) Which protocols work on Network Layer ?
   7) What does WAN mean ?
   8) Give two examples of client server application.
   9) Give two disadvantages of Ring Topology.
   10) What does VPN stand for ?

2. Attempt **any two** of the following : **(5×2=10)**
   1) Explain in brief various different topologies.
   2) State functions of a Network Operating System.
   3) Explain the working of a Print Server.

P.T.O.

3. Attempt **any two** of the following : **(5×2=10)**
   1) Explain the significance of a Mail Server.
   2) What is a Router ?
   3) What is a Protocol ? Give any four protocols working on Transport and Network Layer.

4. Attempt **any one** of the following : **(10×1=10)**
   1) a) Name any five services with their respective port Nos.
      b) Explain various cables used in Network Installation.

      OR

   2) a) Give any Five Linux Commands with their functions.
      b) Explain the working of a DHCP Server.

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[4017] – 301

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – I)
MT–331 : Set Theory and Logic
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

i) Let A = {{1, 2, 3}, {1, 3}, 1, 2}. State whether $\{1, 2\} \in A$, $\{1, 3\} \subseteq A$? Justify your answer.

ii) State principle of duality for algebra of sets and write dual of the statement : $A \cup (A \cap B) = A$.

iii) Let X = {1, 2, 3, 4, 5}. State identify relation in X.

iv) Define cardinal number and find the cardinal number of the set

$A = \{x \mid x = 2n + 1, n \in \mathbb{N}, 1 \leq n < 7\}$.

v) Find converse and inverse of the statement :
"The home team wins whenever it is raining".

vi) Prove that "If n is an odd integer, then n^2 is odd".

vii) Let Q (x, y) denote the statement "x = y + 3". What are the truth values of the propositions Q (1, 2) and Q (3 0) ?

2. Attempt **any two** of the following : **10**

i) Let ρ be a relation which is reflexive and transitive in the set A. For $a, b \in A$, define $a \sim b$ iff $a \rho b$ and $b \rho a$. Show that $\sim$ is an equivalence relation on A.

ii) For every set A, prove that $A < P(A)$.

iii) For any subsets A, B of a set $\bigcup$, prove that $\overline{A \cup B} = \overline{A} \cap \overline{B}$, where $\overline{A} = \bigcup - A$

P.T.O.

3. Attempt **any two** of the following : **10**

   i) Let P (x) be the statement "student x knows calculus" and let Q (y) be the statement "class y contains a student who knows calculus". Express each of the following as quantifications of P (x) and Q (y) :

      a) Some students know calculus

      b) Not every student knows calculus

      c) Every class has a student in it who knows calculus

      d) Every student in every class know calculus

      e) There is at least one class with no student who knows calculus.

   ii) Show that $\forall x\,(P(x) \wedge Q(x))$ and $\forall x\,P(x) \wedge \forall x Q(x)$ are logically equivalent.

   iii) Show that $\neg\,(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent without using the truth table.

4. Attempt **any one** of the following : **10**

   i) a) Use quantifiers and predicates to express the statement '$\lim_{x \to a} f(x)$ does not exist'

      b) For each natural number n, if $\overline{\overline{A}} = n$, then show that A is not similar to a proper subset of itself.

   ii) a) Prove that "If the domain of a function is countable, then its range is also countable".

      b) Define the terms : Theorem, Proposition, Proof, Axiom and Lemma.

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[4017] – 304

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – IV)
MT – 334 : Group Theory
(2008 Pattern) New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory.***
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

   i) Show by giving an example that a factor group of a non abelian group may be abelian.

   ii) Mark the statement true or false with justification :

   'Any two groups of order 13 are isomorphic'.

   iii) Let S be the group of all rational numbers except 1 with binary operation $a * b = a + b - ab$. Find the solution of the equation $2 * x * 3 = 5$ in S.

   iv) List all normal subgroups of S_3.

   v) Let $\phi : \langle \mathbb{R}, + \rangle \to \langle C^*, \cdot \rangle$ be a homomorphism defined by $\phi(x) = \cos x + i \sin x$. Determine the Kernel of ϕ.

   vi) Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 2 & 5 & 4 \end{pmatrix}, \tau = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 1 & 4 & 5 & 3 \end{pmatrix}$ be permutations in S_5.

   Compute τ_σ^{-1}.

   vii) Prove that S_n is a non abelian group for all $n \geq 3$.

2. Attempt **any two** of the following : **10**

   i) Show that a non empty subset H of a group G is a subgroup of G if and only if

   I) $a, b \in H \Rightarrow ab \in H, \forall\, a, b \in H$

   II) $a \in H \Rightarrow a^{-1} \in H, \forall a \in H$.

ii) Prove that a subgroup of a cyclic group is cyclic.

iii) If x is the product of all elements of a finite abelian group G then show that either x = e or x^2 = e.

3. Attempt **any two** of the following : **10**

i) Prove that N is normal subgroup of G if and only if the product of two right cosets of N in G is again a right coset of N in G.

ii) If $\phi : G \to G'$ is an onto homomorphism with Kernel K then prove that $\frac{G}{K}$ is isomorphic to G'.

iii) Express the permutation $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 7 & 9 & 3 & 5 & 8 & 4 & 1 & 6 \end{pmatrix}$ as a product of disjoint cycles. Find $\sigma^{-1}, 0(\sigma)$ and determine whether σ is even or odd.

4. Attempt **any one** of the following : **10**

i) a) State and prove Lagrange's theorem. **7**

b) If H is a subgroup of a group G then prove that any two right cosets of H in G are either identical or disjoint. **3**

ii) a) If H is the only subgroup of order o(H) in a finite group G then prove that H is a normal subgroup of G. **7**

b) Express the product (1, 2, 3) (4, 5) (1, 6, 7, 8, 9) (1, 5) as a product of disjoint cycles. **3**

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[4017] – 308

T.Y. B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII)
MT – 337 Elective B : Lattice Theory
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt **any five** of the following : **10**

   i) Give example of a modular lattice.

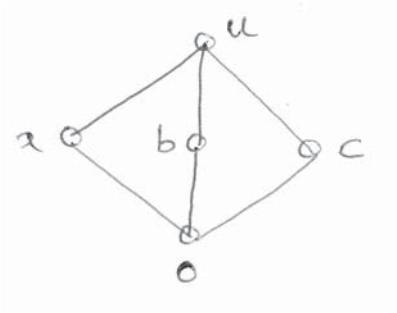
   ii) Write all ideals of a lattice of positive factors of 18 under divisibility.

   iii) Draw the circuit represented by
   $(c \wedge d \wedge e) \vee [(f \vee g) \wedge h]$.

   iv) In a lattice, prove that meet homomorphism preserves the order.

   v) True or false ? Justify. The union of two ideals of a lattice is an ideal.

   vi) Show that the following lattice is not distributive.



   vii) In a Boolean algebra B_1 show that $(a')' = a$ for all $a \in B$.

2. Attempt **any two** of the following : **10**

   i) Draw the diagram of the lattice of positive factors of 20 under divisibility. Show that it is same as that of the product of two chains with three and two elements.

P.T.O.

ii) Let L be a lattice satisfying Descending Chain Condition (DCC). Suppose $a_1\ b \in L$ and $a \not\leq b$. Show that there exists a join-irreducible element x such that $x \leq a$ and $x \not\leq b$.

iii) Draw the normal subgroup lattice of the group $\mathbb{Z}_2 \times \mathbb{Z}_4$. Justify your answer.

3. Attempt **any two** of the following : **10**

i) If M and N are modular lattices, then show that M × N is modular.

ii) For any set X, show that its power set $\mathcal{P}(X)$ under $\subseteq$ is a complete lattice.

iii) Write the DNF of the following function :

$f(x, y, z) = [(x \wedge y')'vz'] \wedge (x' \vee z)'$.

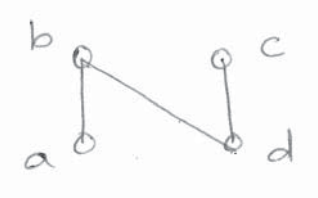
4. Attempt **any one** of the following : **10**

i) a) Show that every chain is a distributive lattice.

b) In a Boolean algebra B, prove that $(a \wedge b)' = a' \vee b'$ for all $a, b \in B$.

ii) a) State and prove Knaster – Tarski Fixpoint theorem.

b) Write the family of all down-sets of the poset.



Also draw the diagram of this family.

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[4017] – 310

T.Y.B.Sc. (Semester – III) Examination, 2011
MATHEMATICS (Paper – VII)
MT- 337 (Elective – D) : Differential Geometry
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B.**: 1) **All** questions are **compulsory.
*2) Figures to the **right** indicate **full** marks.*

1. Attempt **any five** of the following : **10**

i) Define a regular curve. Show that $\underline{\underline{\gamma}}$ (t) = (e^t cos t, e^t sin t) is a regular curve.

ii) Show that $\underline{\underline{\gamma}}$ (t) = $\left(\frac{4}{5}\cos t, 1-\sin t, \frac{-3}{5}\cos t\right)$ is a unit speed curve and find its curvature.

iii) Define a simple closed curve and give an example of a simple closed curve.

iv) Let a, b, c be non-zero real numbers. Show that the level surface $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ is a smooth surface.

v) Find the equation of the tangent plane of

$\underline{\underline{\sigma}}(r,\theta) = \left(r\cosh\theta, r\sinh\theta, r^2\right)$ at (1, 0, 1).

vi) Let $\underline{\underline{\gamma}}$ be a unit speed plane curve and $\underline{\underline{a}}$ be a unit vector which is perpendicular to the plane containing the curve $\underline{\underline{\gamma}}$.

Find the first fundamental form of $\underline{\underline{\sigma}}$ (u, v) = $\underline{\underline{\gamma}}$ (u) + v $\underline{\underline{a}}$

vii) State Meusnier's theorem.

P.T.O.

2. Attempt **any two** of the following : **10**

i) The Cissoid of Diodes is the curve whose equation in terms of polar coordinates (r, θ) is r = sin θ tan θ, $-\pi/2 < \theta < \pi/2$

Write down a parametrisation of the cissoid using θ as a parameter and show that $\underline{\gamma}(t) = t^2, \left(\frac{t^3}{\sqrt{1-t^2}} \right) -1 < t < 1$

is a reparametrisation of it.

ii) State and prove Frenet-Serret equations.

iii) Let $\underline{\gamma}(s)$ be a unit-speed plane curve, and let φ (s) be the angle through which a fixed unit vector must be rotated anti-clockwise to bring it into coincidence with the unit tangent vector $\hat{t}$ of $\underline{\gamma}$. Then prove that Ks = $\frac{d\varphi}{ds}$.

3. Attempt **any two** of the following : **10**

i) Let S_1 and S_2 be surfaces and f : $S_1 \rightarrow S_2$ be a diffeomorphism. If for any surface patch $\underline{\sigma}_1$ of S_1, the pacthes $\underline{\sigma}_1$ and $f_0\ \underline{\sigma}_1$ of S_1 and S_2 respectively, have the same first fundamental form then show that f: $S_1 \rightarrow S_2$ is an isometry.

ii) For the sphere in latitude longitude longitude co-ordinates

$\underline{\sigma}(\theta, \varphi) = (\cos\theta \cos \varphi, \cos\theta \sin\varphi, \sin\theta)$

Calculate the first and second fundamental forms.

iii) Determine the principal curvatures of the right circular cylinder given by

$\underline{\sigma}(u, v) = (\cos v, \sin v, u)$.

4. Attempt **any one** of the following : **10**

a) i) Show that the limaçon

$\underline{\underline{\gamma}}(t) = ((1 + 2 \cos t) \cos t, (1 + 2 \cos t) \sin t)$ is a regular curve such that

$\gamma(t + 2\pi) = \gamma(t)$ for all values of t, but $\underline{\underline{\gamma}}$ is not a simple closed curve.

ii) Let S_1 and S_2 be surfaces and $f : S_1 \to S_2$ be a diffeomorphism. When do you say that f is a conformal map ? When do you say that f is an equiareal map ? If f is both equiareal map and conformal map then show that f is an isometry.

b) i) Let $\underline{\underline{\gamma}}(t) = (x(t), y(t))$ be a positively-oriented simple closed curve in $\mathbb{R}^2$ with period a. Then show that

$$d(\text{int}(\underline{\underline{\gamma}}) = \frac{1}{2}\int_0^a (x\dot{y} - y\dot{x})\, dt$$

.

ii) Consider the surface patch $\underline{\underline{\sigma}}(u, v) = (u \cos v, u \sin v, u)$ and the curve on this surface patch given by $u = e^{\lambda t}$, $v = t$, where λ is a constant. Find the length of the part of the curve with $0 \le t \le \pi$.

[4017] – 314

T.Y. B.Sc. (Semester – III) Examination, 2011
Paper – I : PHYSICS
PH-331 : Mathematical Methods in Physics
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. : *i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicate **full** marks.*
iii) Use of log-table or calculator is allowed.

1. Attempt **all** of the following (**one** mark **each**) : **10**

a) State order and degree of differential equation.

$$\frac{d^3y}{dx^3} + \sqrt{\frac{d^2y}{dx^2}} + y = 0 .$$

b) State Galilean transformation equations.

c) What do you mean by length contraction ?

d) State generating function for Legendre polynomials.

e) Define the term metric coefficients.

f) Draw co-ordinate surfaces in cylindrical co-ordinate system.

g) State the conditions for the point $x = x_0$ to be regular singular point.

h) Show that x = 0 is ordinary point of equation.
$y'' - 2xy' + 2\lambda y = 0.$

i) Write ∇^2 in orthogonal curvilinear system.

j) What is relativistic Doppler effect ?

P.T.O.

2. Attempt **any two** of the following : **10**

a) Show that $x = \infty$ is irregular singular point of differential equation $y'' + w^2 y = 0$.

b) Prove that $H_n(x) = (-1)^n H_n(-x)$.

c) Represent $\vec{A} = y\vec{i} - 3\vec{j} + x\vec{k}$ in spherical polar co-ordinates and obtain Ar, A_θ, $A\phi$.

3. Attempt **any two** of the following : **10**

a) Obtain expression for $\nabla\phi$ in curvilinear co-ordinate system.

b) Separate the variables in one dimensional wave equation $\frac{\partial^2 u}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 u}{\partial t^2}$ and obtain its solution.

c) Explain Michelson-Morley experiment with its results.

4. A) Attempt **any one** : **8**

a) Find the power series solution about x = 0 of $4xy'' + 2y' + y = 0$.

b) i) If $\hat{e}_r = \sin\theta\cos\phi\,\vec{i} + \sin\theta\sin\phi\,\vec{j} + \cos\theta\vec{k}$

$\hat{e}_\theta = \cos\theta\cos\phi\,\vec{i} + \cos\theta\sin\phi\,\vec{j} - \sin\theta\vec{k}$

and $\hat{e}_\phi = -\sin\phi\vec{i} + \cos\phi\,\vec{j}$

then show that spherical polar co-ordinate system is orthogonal.

ii) Show that square of length element in spherical polar-coordinate is

$dl^2 = (dr)^2 + (rd\theta)^2 + (r\sin\theta d\phi)^2$.

B) Attempt **any one** : **2**

a) The rest mass of electron is 9.1×10^{-31} kg. What will be its mass if it were moving with speed 0.8 C. (Where C is speed of light).

b) What is partial differential equation ? State any two frequently occuring partial differential equations.

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[4017] – 316

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – III)
(2008 Pattern) (New)
PH-333 : Classical Mechanics

Time: 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of logtables and calculators is* ***allowed****.*

1. Attempt **all** of the following (**1** mark **each**) : **10**

a) Find the maximum range of a projectile fired with initial velocity of 9.8 m/s.

b) What do you mean by 'centre of mass' of a system ?

c) State any two properties of central forces.

d) What will be the nature of orbit if e = 1 and E = 0 ?

e) What is the effect of impact parameter on the scattering angle ?

f) Define the term 'cross-section' in the scattering process.

g) What are cyclic co-ordinates ?

h) State the principle of virtual work.

i) What do you mean by inertial frame of reference ?

j) Calculate the fictitious force acting on a freely falling body of mass 10 kg with reference to a frame moving vertically downwards on earth with an acceleration of 5 m/s^2.

2. Attempt **any two** of the following :

a) Explain how the two body problem is reduced to an equivalent one body problem. **5**

b) What are constraints ? Give the classification of constraints with suitable examples. **5**

c) State and prove law of conservation of angular momentum for system of particles. **5**

P.T.O.

3. Solve **any two** of the following :

   a) A rocket starts from rest with velocity of gases 2×10^3 m/s. The total consumption of the fuel is $\frac{90}{100}$ of the initial mass of the rocket. Calculate the velocity of the rocket before the whole fuel is consumed. **5**

   b) The Satellite revolves in circular orbit around the earth at a height of 1000 km above the surface of earth. Calculate its orbital velocity. **5**

   c) Earth rotates with angular velocity $\omega = 7.27\times10^{-5}$ sec^{-1}. Calculate centrifugal acceleration at the equator. Also calculate the coriolis acceleration for the object moving with velocity of 10^5 cm/sec. Radius of earth = 6.46×10^6 m. **5**

4. A) Attempt **any one** of the following :

   a) What is elastic scattering ? Obtain the relation between position vectors and velocities in LAB and CM frame. **8**

   b) Obtain Lagrange's equation of motion from D'Alembert's principle. **8**

   B) Attempt **any one** of the following :

   a) In proton -electron ($m_2 > > m_1$), show that the scattering angles in LAB and CM frames are same. **2**

   b) What is coriolis force ? **2**

[4017] – 317

T.Y. B.Sc. (Semester – III) Examination, 2011
PHYSICS (Paper – IV), (New) (2008 Pattern)
PH – 334 : Atomic and Molecular Physics

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory.***
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of log tables and calculators is* ***allowed.***

1. Attempt **all** of the following (**one** mark **each**) : **10**

   a) State Duane and Hunt Law.

   b) What is anomalous Zeeman Effect ?

   c) What is the multiplicity of state ?

   d) State Pauli's exclusion principle.

   e) What is an electronic configuration ?

   f) What is L-S coupling scheme ?

   g) Determine atomic states for L = 2, and S = $\frac{1}{2}$.

   h) State third postulate of Bohr's theory.

   i) What are equivalent electron ?

   j) What is Rayleigh scattering ?

2. Attempt **any two** of the following :

   a) State and prove Lande's interval rule. Represent it graphically for $^3D_{123}$ terms. **5**

   b) Discuss the experimental set-up to observe the Zeeman Effect with neat diagram. **5**

   c) What is Raman effect ? Explain it on the basis of quantum mechanics. **5**

P.T.O.

3. Attempt **any two** of the following :

   a) Determine the shortest wavelength which can be produced in X-Ray machine when 80 KV accelerating potential is applied to the machine.

   (Given : C = 3×10^{8} m/s, h = 6.64×10^{-34} Js, e = 1.6×10^{-19}C). **5**

   b) Determine the percentage decrease in linear velocity of an electron when it is transferred from first orbit to tenth orbit of Hydrogen atom.

   (Given : e = 1.6×10^{-19}C, $\in_0$ = 8.85×10^{-12} C^2/Nm^2, h = 6.64×10^{-34} Js). **5**

   c) The separation between vibrational energy levels of CO molecule is 0.09 eV. The masses of carbon atom and oxygen atom are 20.04×10^{-27} kg and 26.72×10^{-27} kg respectively. Calculate the reduced mass of CO molecule and find the value of force constant K.

   (Given : h = 6.64×10^{-34} Js). **5**

4. A) Attempt **any one** of the following :

   a) Give the electronic configuration of sodium atom. Discuss the spectra of sodium atom with energy level diagram. **8**

   b) What are three major types of molecular spectra ? Show that the vibrational energy levels of diatomic molecule are given by an expression

   $$E_v = \left(V + \frac{1}{2}\right)\frac{h}{2\pi}\sqrt{\frac{k}{\mu}}$$

   where symbols have their usual meanings. **8**

   B) Attempt **any one** of the following :

   a) Give any two applications of Raman spectroscopy. **2**

   b) Explain the importance of Moseley's Law. **2**

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[4017] – 318

T.Y. B.Sc. (Semester – III) (New) Examination, 2011
Paper – V : PHYSICS
PH-335 : 'C' Programming and Computational Physics
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B: *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Flow charts may be drawn with **pencil**.*
*4) **Use** of electronic calculator or logtable is **allowed**.*

1. Attempt **all** of the following (**one** mark **each:**) **10**
   a) Define algorithm.
   b) Give syntax of scanf function.
   c) What is the purpose of switch statement ?
   d) State different types of data used in 'C'
   e) What is use of break statement ?
   f) Write syntax of for statement.
   g) What is inherent error ?
   h) Define keywords.
   i) How arrays are declared ?
   j) What is difference between gets ( ) and puts () function ?

2. Attempt **any two** of the following :
   a) What is constants ? Explain any two with appropriate examples. **5**
   b) What is meant by looping ? Describe two examples of looping. **5**
   c) What is graphics ? State application of it. **5**

3. Attempt **any two** of the following :
   a) Give different rules for declaration of variable. **5**
   b) Write a 'C' program to calculate sum of numbers using array. **5**
   c) What are iterative techniques ? Give two examples of iterative techniques. **5**

P.T.O.

4. Attempt **any one** of the following :

a) i) In the experiment of determination of coefficient of linear expansion, following observations of temperature in °C and length l in mm of heated rod. If l = a + bt Find the best values for a and b. 4

T (°C)	20	30	40	50	60	70
l **(mm)**	400.3	400.4	400.6	400.7	400.9	401.0

ii) Write an algorithm to find integration by Simpson's $1/3^{rd}$ rule. **4**

b) i) Find the smallest positive root of $x^2 - 5x + 3 = 0$ using Newton–Raphson method using 3 iterations. **4**

ii) What do you mean by flow chart ? Explain meaning of various symbols used in flow chart. **4**

4. Attempt **any one** of the following.

a) Write formula for Trapezoidal rule. **2**

b) State the out put of the following **2**

'C' program

```
# include < stdio.h >
    main ( )
{
    int digit = 0;
    while (digit < = 4)
    {
        Print f (" \ n % d", digit);
        + + digit ;
    }
}
```


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[4017] – 320

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – I)
CH – 331 : Physical Chemistry
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of logarithmic table and calculator is **allowed**.*
*4) **Actual calculations** must be shown while solving problems.*

1. Answer the following : **10**

a) Define order of a reaction.

b) CO_2 does not show rotation spectra. Why ?

c) State the Bragg's equation and give the significance of the term involved in it.

d) Define the term adsorbent with suitable example.

e) The intercept by crystal plane on the three crystallographic axes are $^4/_3$, 1 and $^1/_2$. Calculate Miller indices.

f) For simple cubic lattice, sketch 100, 110 and 111 planes.

g) What will be the frequency associated with 0.4μ radiation ?

($C = 3\times10^{10}$ cm sec^{-1}).

h) 50% of H_2O_2 decomposes in 10 minutes in an experiment. Calculate velocity constant, if the reaction is first order.

i) Write the unit of rate constant for the reaction $3A \rightarrow$ Product.

j) Define the term 'dipole moment'.

2. A) Attempt the following (**any two**) : **6**

i) What is rate constant ? Obtain the rate equation for second order reaction with equal initial concentration.

ii) Explain stokes and antistokes lines in Raman spectra.

iii) What is Crystallography ? Explain the law of constancy of interfacial angle.

P.T.O.

B) Solve **any one** of the following : **4**

i) Calculate the interplanar spacing of set of planes if the angle for first order diffraction is 22.5° when X-ray of wave length 1.53 A° are used.

ii) Calculate rotational constant of NO molecule if bond length is 1.15 A°. (Atomic weight : N = 14, O = 16, h = 6.624×10^{-27} erg. sec. Avogadro's Number = 6.023×10^{23} C = 3×10^{10} cm sec^{-1}).

3. Answer **any two** of the following : **10**

i) Derive the expression of wave number of lines in vibrational-rotational spectrum. Draw energy level diagram of vibrational - rotational spectra for diatomic molecule.

ii) Describe Laue method for the determination of crystal structure. What are the disadvantages of this method ?

iii) Derive expression for Langmuir adsorption isotherm, giving its assumptions.

4. A) Derive an expression for the energy of transition from $J \rightarrow J+1$ level in rotational spectrum of a simple diatomic molecule. **6**

OR

A) Attempt the following :

i) Derive an expression for rate constant of reaction in which single reacting gas is moderately adsorbed. **3**

ii) Distinguish between Raman spectrum and Infrared spectrum. **3**

B) Solve **any one** of the following : **4**

i) The specific rate constant for the reaction of decomposition of N_2O_5 vapour found to be 3.46×10^{-5} at 298 k and 4.87×10^{-3} at 338 k. Determine the activation energy of the spectrum. [R = 8.314 JK^{-1}]

ii) The dipole moment of certain molecule is 1.73×10^{-18} esu.cm. Calculate the orientation polarisation of the substance at 27°C.

Boltzman constant = k = 1.38×10^{-16} erg deg^{-1} $molecule^{-1}$

π = 3.14

Avogadro's number N = 6.023×10^{23}

[4017] – 322

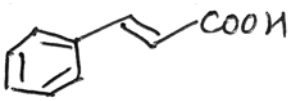
T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – III)
CH – 333 : Organic Chemistry (2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B.: *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw the structures and ***neat*** *diagram* ***if necessary.***

1. Answer the following : **10**

i) Write the trivial and IUPAC name for



ii) Cis-1, 2 dimethyl cyclohexane doesnot show any optical activity. Why ?

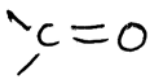
iii) Monochloroacetic acid is stronger acid than acetic acid. Why ?

iv) State Saytzeff rule.

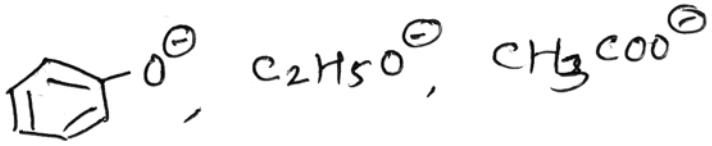
v) What is PCC ?

vi) Propylene reacts with HBr in presence of peroxide and forms 1-bromopropane as a major product.

vii) Give factors affecting addition of nucleophile to



viii) Arrange the following in decreasing basicity order



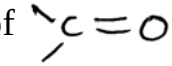
P.T.O.

ix) As size of leaving group increases, proportion of Hofmann product increases. Why ?

x) Aniline is weaker base than cyclohexyl amine.

2. A) Answer **any two** of the following : **6**

i) Explain hydrogen bonding with suitable example.

ii) Explain addition-elimination reaction of  compound with hydroxyl amine and phenyl hydrazine.

iii) What is elimination reaction ? Compare SN^2 and E^2 reaction with help of following points.

a) Structure of substrate

b) Stability of alkene formed.

B) Attempt **any two** of the following : **4**

i) 1-butene on ozonolysis gives formaldehyde as a product but 2-butene doesnot. Explain.

ii) Determine which is good leaving group in each pair.

a) $\overset{\ominus}{O}H$ and $\overset{\ominus}{O}CH_3$ b) $\overset{\ominus}{O}H$ and $H_3O^{\oplus}$

iii) Explain with mechanism when propene reacts with $Hg(OAC)_2/H_2O$ and $NaBH_4$.

3. Attempt **any two** of the following : **10**

i) Draw chair conformations of trans 1, 3 dimethyl cyclohexane and comment on their stability and optical activity.

ii) What is E1 mechanism ? Discuss evidences for E1 mechanism.

iii) Define the resonance effect. Give four conditions necessary for resonance. Explain picric acid is more acidic than phenol.

4. A) i) Discuss mechanism of addition of diborane to propylene. **3**

ii) Discuss mechanism of Cannizzaro's reaction with suitable example. **3**

OR

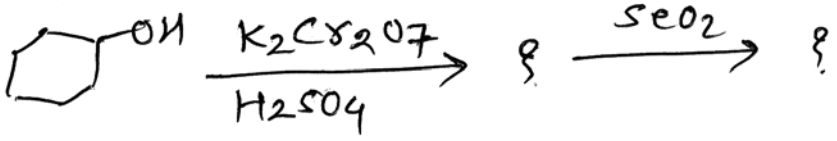
A) i) What is SN^1 reaction ? Discuss the stereochemistry of SN^1 reaction. **4**

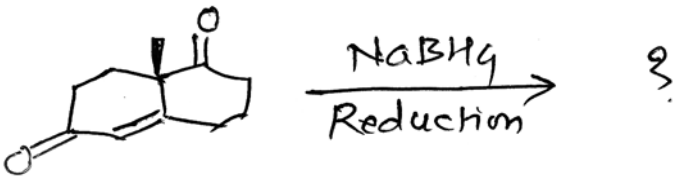
ii) Determine good nucleophile in each pair **2**

a) $\overset{\ominus}{N}H_2$ and NH_3

b) $R–\overset{\ominus}{O}$ and R–OH

B) Predict the product with justification **4**

i) 

ii) 

OR

B) Write notes on : **4**

i) Hofmann elimination

ii) Markovnikov's rule.

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[4017] – 323

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – IV)
CH-334 : Analytical Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of log tables and the calculators is* ***allowed****.*
4) ***Neat*** *diagram must be drawn* ***wherever*** *necessary.*

1. Answer the following : **10**

1) What is thermogravimetric analysis ?

2) Define the term 'Faraday'.

3) Define the term 'Auxochrome'.

4) What do you know about hypo chromic shift ?

5) State Faraday's second law of electrolysis.

6) Define the term 'detection limit' in AAS.

7) What is meant by chemical interference in AAS ?

8) Mention different types of fuels used in FES.

9) What is cation-cation interference in FES ?

10) Calculate the turbidence if transmittance τ=0.640.

2. a) Solve **any two** of the following : **6**

1) Give uses and care of electrodes in electrogravimetry.

2) Draw block diagram of double beam spectrophotometer and explain its various components.

3) Explain the construction and working of Nephelometer.

P.T.O.

b) Solve **any two** of the following : **4**

1) What is digestion ? Give its advantages.

2) If 5.0A current is passed through $AgNO_3$ solution for one hour calculate weight of silver deposited.

[Electrochemical Equivalent of Ag = 1.118×10^{-3}].

3) The transmittance of 2×10^{-3} M solution of a substance was found to be 80% at 350 nm. when placed in a cell of 1 cm inner diameter. Calculate molar absorptivity of the solution.

3. Answer **any two** of the following : **10**

1) What are organic precipitant ? Explain with the help of chemical reaction the use of DMG in the precipitation of Ni. Give the advantages and disadvantages of organic precipitant.

2) Give the principle of AAS. Give the construction and working of hollow cathode lamp in AAS.

3) Describe the applications of FES.

4. a) What is homogeneous precipitation ? Explain it with three examples. **6**

OR

a) i) Discuss the construction and working of single beam spectrophotometer. **3**

ii) Give the analytical applications of Nephelometry and Turbidimetry. **3**

b) The solubility product of $Mg(OH)_2$ is 1.18×10^{-11} at 25°C. Calculate solubility in grams per litre.
Given : Molecular weight of $Mg(OH)_2$ =58. **4**

OR

b) A 4×10^{-4} M solution of aniline in water has absorbance 0.504 at 280 nm when measured in 1 cm cell. Find the transmittance of 2.5×10^{-3} M aniline solution in water when measured at same wavelength but in 0.5 cm cell. **4**

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[4017] – 324

T.Y. B.Sc. (Semester – III) Examination, 2011
CHEMISTRY (Paper – V)
CH – 335 : Industrial Chemistry
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Draw neat *diagram and flow sheet* ***wherever*** *necessary.*

1. Answer the following : **(10)**

i) Explain the term 'process control'.

ii) What are advantages of contact process ?

iii) What is sulphitation ?

iv) Define the term 'denatured spirit'.

v) What is recycling ?

vi) What do you mean by capital cost ?

vii) Define the term 'fermentation'.

viii) What do you mean by inversion of sugar ?

ix) What are complete fertilizers ?

x) What are organic process wastes ?

2. A) Attempt **any two** of the following : **(6)**

i) Explain the terms unit process and unit operation with suitable examples.

ii) What are the functions of essential nutrients ?

iii) Give merits of vanadium catalyst over the platinized asbestos.

P.T.O.

B) Answer **any two** of the following : **(4)**

i) Write a short note on 'classification of chemical reactions'.

ii) What are the functions of Human resource ?

iii) Give an account of nature of waste and its treatment, of soap and detergent industries.

3. Answer **any two** of the following : **(10)**

i) Describe manufacture of sugar from sugarcane with special reference to purification of juice.

ii) Discuss the manufacture of ethyl alcohol from hydrocarbon with flowsheet diagram.

iii) Discuss the various general methods used for the treatment and disposal of industrial wastes.

4. A) Give an account of physico-chemical principles involved in manufacture of nitric acid by Ostwald's process. **(6)**

OR

A) What are fertilizers ? Discuss in detail the manufacture of urea with flowsheet diagram and chemical reactions involved.

B) Discuss the utilization of by-products of sugar industry. **(4)**

OR

B) Explain with diagram, the construction and working of coffey still.

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[4017] – 327

T.Y. B.Sc. (Semester – III) Examination, 2011
BOTANY (Paper – II) (New Course) (2008 Pattern)
BO-332 : Molecular Biology

Time : 2 Hours Max. Marks : 40

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
*ii) Draw n****eat*** *labelled diagrams* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

a) What is transcription ?

b) Define DNA damage.

c) Mention model organisms used in study of molecular biology.

d) What is contribution of Franklin and Wilkin's in molecular biology ?

e) What are okazaki fragments ?

f) What is photoreactivation ?

g) Mention role of m-RNA in protein translation.

h) What are repressible enzymes ?

i) Define RNA-splicing.

j) Define Proteomics.

2. Attempt **any two** of the following : **10**

a) Differentiate DNA and RNA as genetic material.

b) Explain in brief mechanism of DNA replication in prokaryotes.

c) Describe the structure and role of t-RNA in translation.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Lipid as molecule of cell.

   b) Regulation of metabolism.

   c) Functional genomics.

4. Explain the structure and function of eukarytotic gene. **10**

   OR

   What is genetic code ? Explain the properties of genetic code.

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[4017] – 328

T.Y. B.Sc. (Semester – III) Examination, 2011
BOTANY (Paper – III)
BO-333 : Angiosperms and Evolution (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

1. Attempt the following : **(10)**
   a) Which system of classification was proposed by Bentham and Hooker ?
   b) Name type of inflorescence in family Asteraceae.
   c) Give floral formula of family Lamiaceae.
   d) Enlist two distinguishing characters of family Orchidaceae.
   e) State two examples of family Amaranthaceae.
   f) Enlist two similarities of pteridosperms with Angiosperms.
   g) Define herbarium.
   h) Enlist types of endemics.
   i) State two achievements of BSI.
   j) Mention any one phytogeographical region of India with an example of plant.

2. Answer **any two** of the following : **(10)**
   a) Give distinguishing characters with example of family Cannaceae.
   b) Explain procedure of preparation of specimen for herbarium.
   c) Discuss contribution of H. Santapau.

3. Write short notes on following **(any two)** : **(10)**
   a) Merits of Hutchinson's system of classification.
   b) Bennettitalean theory of origin of Angiosperms.
   c) Endemic plants of Maharashtra.

4. Give distinguishing characters, floral formula and floral diagram of family Nyctaginaceae and sub family Caesalpinaceae. **(10)**

   OR

   What is speciation ? Discuss allopatric and sympatric types of speciations in plants. **(10)**

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[4017] – 329

T.Y. B.Sc. (Semester – III) Examination, 2011
BOTANY (Paper – IV)
BO – 334 : Genetics and Plant Breeding
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory.***
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Draw ***neat*** *labelled diagrams* ***wherever*** *necessary.*

1. Answer the following : **10**
   a) Define genetics.
   b) What are alleles ?
   c) Define plasma genes.
   d) What is linkage ?
   e) Define holandric genes.
   f) What are mutations ?
   g) Define chromosomal aberrations.
   h) What is heterosis ?
   i) Define mutation breeding.
   j) Give the definition of plant breeding.

2. Answer **any two** of the following : **10**
   a) Explain duplicate gene interaction with a suitable example.
   b) Explain quantitative inheritance in maize.
   c) Give disadvantages of plant introduction.

3. Write notes on (**any two**) : **10**
   a) Balance concept of sex determination in Drosophila.
   b) Plastid inheritance in Mirabilis.
   c) Clonal selection.

4. What is polyploidy ? Explain origin and effects of auto and allopolyploidy. **10**

   OR

   Explain various steps involved in the procedure of hybridization. **10**

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[4017] – 330

T.Y. B. Sc. (Semester – III) Examination, 2011
BOTANY (Paper – V)
BO-335 : Biometry and Computer Applications
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory.***
ii) Draw neat labelled diagrams ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer the following : **10**

a) What is mode ?

b) Define probability.

c) Define random sampling.

d) What is range ?

e) Define population.

f) What is ROM ?

g) What is the function of CPU ?

h) What is E-mail ?

i) What is print preview ?

j) What is internet ?

P.T.O.

2. Attempt **any two** of the following : **10**

   a) Give scope of Biometry.

   b) Explain binomial distribution.

   c) What is LAN ? Write about topologies of LAN.

3. Write short notes on **any two** of the following : **10**

   a) Correlation

   b) Output Devices

   c) Applications of Windows.

4. Calculate mean, mode and median from the given data. **10**

   8,7,8,7,6,5,9,4,7,7.

   OR

   What is PowerPoint presentation ? Give its important features in detail. **10**

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[4017] – 331

T.Y. B.Sc. (Semester – III) Examination, 2011
BOTANY (Paper – VI)
BO-336 : Cell Biology and Seed Technology
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Draw*** *neat labeled diagrams* ***wherever*** *necessary.*
iii) Figures to the ***right*** *indicates* ***full*** *marks.*

1. Attempt the following : **10**
   a) Mitochondria can replicate themselves, why ?
   b) Give important functions of chromoplast.
   c) Define cell cycle.
   d) Enlist any two types of Lysosomes.
   e) Who proposed cell theory ?
   f) What are plastids ?
   g) Mention any two functions of Ribosomes.
   h) Define seed.
   i) Why proper seed storage is necessary ?
   j) What is seed certification ?

2. Answer **any two** of the following : **10**
   a) Describe development of chloroplast in eukaryotic cell.
   b) Differentiate between prokaryotic and enkaryotic cell.
   c) Explain seed processing.

3. Write short notes on **any two** of the following : **10**
   a) Ultrastructure of mitochondria.
   b) Chemical composition of Golgi body.
   c) Role of seed technology.

4. Describe the structure of normal chromosome in detail. **10**

   OR

   What is seed sampling ? Describe the types of seed samples and add a note on sampling equipments. **10**

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[4017] – 333

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – II)
ZY – 332 : Mammalians Histology
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

2) Neat labelled diagrams must be drawn ***wherever*** *necessary.*

3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

1) Define areolar connective tissue.

2) What is epidermis ?

3) What is kupffer cell ?

4) What are rugae ?

5) State the function of sebaceous glands.

6) Define Goblet cell.

7) Give names of the cells of pituitary gland.

8) Define filiform papilla.

9) Define corpus luteum.

10) What is holocrine secretion ?

2. Attempt **any two** of the following : **10**

i) Describe histological structure of sublingual gland.

ii) Describe histological structure of testis.

iii) Describe histochemical reaction for demonstration of carbohydrates.

P.T.O.

3. Write short notes on **any two** of the following : **10**

   a) Sketch and label V.S. of tooth

   b) Histology of lung

   c) Histology of thyroid gland

   d) Epithelial tissue.

4. Describe histological structure of kidney. **10**

   OR

   Describe histological structure of ileum. **10**

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[4017] – 335

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – IV) (2008 Pattern)
ZY – 334 : Environmental Biology and Toxicology
(New Course)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *labelled diagrams must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

1) What is acid rain ?

2) What are renewable sources ?

3) Define ecology.

4) Name any two factors influencing toxicity.

5) Explain lithosphere.

6) When the Environmental Protection Act (EPA) was introduced ?

7) What is dB ?

8) Define biogeochemical cycle.

9) What are toxicants ?

10) Name any two non-biogradable pollutants.

2. Attempt **any two** of the following : **10**

i) Describe green house effect .

ii) Describe effects of pesticides on Public health.

iii) Describe significance of wildlife conservation.

P.T.O.

3. Attempt **any two** of the following : **10**

   a) Importance of ozone layer.

   b) LC 50

   c) Endangered species

   d) Ecological pyramids.

4. What are natural resources ? Explain any two natural resources. **10**

   OR

   What is artificial ecosystem ? Explain the structure and function of cropland ecosystem.

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[4017] – 336

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – V)
ZY – 335 (a) : General Pathology (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B.: *1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *labelled diagram must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

1) What is surgical pathology ?

2) Define aetiology.

3) What are endogenous pigments ?

4) Define pathologic calcification.

5) What is necrosis ?

6) Mention types of leukaemia.

7) What are four cardinal signs of inflammation ?

8) Name the diseases caused by viruses.

9) Define thrombosis.

10) What is abscess ?

2. Attempt **any two** of the following : **10**

i) What is gangrene ? Explain moist type of gangrene.

ii) Describe the importance and procedure of gastric analysis.

iii) Define Hyperaemia. Explain causes and effects of active hyperaemia.

P.T.O.

3. Write notes on **any two** of the following : **10**

   a) Ischaemia

   b) Malignant tumour

   c) Secondary Healing

   d) Jaundice.

4. What is Oedema ? Explain the factors, causes and types Oedema. **10**

   OR

   Describe the process and types of repair. **10**

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[4017] – 336

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – V)
ZY – 335 (b) : Basic Entomology (New Course)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B.: *I)* ***All*** *questions are* ***compulsory****.*
II) ***Neat*** *labelled diagrams must be drawn* ***wherever*** *necessary.*
III) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Attempt the following : **10**

1) Explain hypognathous type of head.

2) Enlist any two sensory receptors.

3) Define Entomology.

4) Enlist the abdominal appendages.

5) Name any two types of insect mouth parts.

6) Explain aristate antenna.

7) What is forensic entomology ?

8) Name any two medicinal uses of insects.

9) Name any two functions of ocelli.

10) What is elytra ?

2. Attempt **any two** of the following : **10**

I) Describe cursorial type of leg.

II) Describe the structure of light producing organ in insect.

III) Describe different types of insect larvae.

3. Write notes on **any two** of the following : **10**

   a) Importance of insects in cosmetics.

   b) Primer pheromone.

   c) Genital appendages in insects.

   d) Structure of insect egg.

4. What is metamorphosis ? Describe hemimetabola type of metamorphosis and add a note on hormonal control of metamorphosis. **10**

OR

4. Describe the structure of sound producing organ in cicada and add a note on its of sound production. **10**

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[4017] – 337

T.Y. B.Sc. (Semester – III) Examination, 2011
ZOOLOGY (Paper – VI)
Zy-336 : CELL BIOLOGY
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

N.B. *1) **All** questions are **compulsory.***
*2) **Neat** labelled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following : **10**

1) Define necrobiosis.

2) Enlist different stages of mitosis.

3) Define cell biology.

4) Define Plasmodesmata.

5) Give any two functions of lysosomes.

6) Define cell adhesion.

7) Define oncogene.

8) What are free radicals ?

9) Give two characteristics of cancer cell.

10) Define active transport.

2. Attempt **any two** of the following : **10**

i) Distinguish between eukaryotic and prokaryotic cell.

ii) Describe intrinsic causes of cancer.

iii) Describe various membrane receptors.

P.T.O.

3. Write notes on **any two** of the following . **10**

   a) Functions of Golgi complex.

   b) Mitochondria

   c) Prophase I of meiosis.

   d) Functions of cytoskeleton.

4. Describe in detail structure and function of endoplasmic reticulum. **10**

   OR

   Describe general organization, chemical composition and functions of nucleolus. **10**

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[4017] – 339

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOLOGY (Paper – II)
GL – 332 : Igneous Petrology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1) All questions are **compulsory**.*
*2) **All** questions carry **equal** marks*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Neat** diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2-3** lines. **10**

a) Give the boundary conditions for the generation of basaltic magmas.

b) Name the constituents of the discontinuous reaction series.

c) What is meant by thermal diffusion ?

d) Name any two minerals which crystallise during the process of flow differentiation.

e) What is the significance of poikilitic texture ?

f) Which rocks are expected to show the presence of expansion cracks ?

g) Which magma separation mechanism is likely to produce pegmatites and aplites ?

h) What is meant by the term 'gas streaming' ?

i) What are contaminated granites ?

j) What is a cumulate texture ?

2. Answer the following (**any two**) : **10**

a) IUGS classification of volcanic rocks

b) Flow differentiation

c) Incorporation of equilibrated foreign matter during contamination.

P.T.O.

3. Write notes on (**any two**) : **10**

   a) Origin and significance of peridotite .

   b) Density and viscosity of magmas.

   c) Importance of Reaction series.

4. Describe in detail, the crystallisation of Ab-An-Di system. **10**

OR

Writes notes on :

a) Complexity in classification of igneous rocks.

b) Primary magmas.

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[4017] – 340

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOLOGY (New) (Paper – III)
GL-333 : Sedimentary Petrology (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Black figures to the **right** indicate **full** marks.*
*4) Neat diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2-3** lines. **10**
   a) Define a sedimentary facies.
   b) What are syngenetic ore deposits ?
   c) Name any four heavy minerals.
   d) Give an equation for determination of roundness of detrital grains.
   e) What are concretions ?
   f) What is the significance of graded bedding ?
   g) Name any two minerals which indicate a metamorphic provenance.
   h) What is meant by progressive dilution ?
   i) Define a non-clastic texture.
   j) Name the elements of tectonic movements.

2. Write notes on **(any two)** : **10**
   a) Laboratory studies (methodology) for studying sedimentary rocks.
   b) Hydrolysis and its significance during weathering.
   c) Significance of nodules.

3. Write notes on (**any two**) : **10**
   a) Physical parameters of a depositional environment.
   b) Surface processes of rock weathering.
   c) Tectonic control on sedimentation.

4. Define, describe and give significance of ripple marks and laminations. **10**

   OR

   Describe in detail, the classification of depositional environment.

[4017] – 341

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOLOGY (Paper – IV)
GL-334 : Structural Geology
(2008 Pattern) (New)

Time : 2 Hours Total Marks : 40

Instructions : *1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Black figures to the **right** indicate **full** marks.*
*4) Neat diagrams must be drawn **wherever** necessary.*

1. Answer the following in **2/3** lines : **10**

   a) Define Reicke's principle.

   b) Define compression force.

   c) Define fracture clevage.

   d) Define high and low angle thrust fault.

   e) Distinguish between balanced and imbalanced forces.

   f) Define strain.

   g) Define a shear folding.

   h) Define the term nappe.

   i) State the factors controlling behaviour of materials.

   j) Define foliation.

2. Write notes on (**any two**) : **10**

   a) Explain the mechanics of strike-slip fault.

   b) Explain anisotrophy and inhomogenity.

   c) Define lineation and give its type.

P.T.O.

3. Write notes on (**any two**) : **10**

   a) Describe the various types of forces.

   b) Describe the term piercement and non-piercement dome.

   c) Describe the term composition and resolution.

4. Describe with the help of neat diagram different stages of deformation. **10**

OR

4. a) Define the term fundamental strength and rupture strength. **5**

   b) Explain the concept of stress ellipsoid. **5**

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[4017] – 345

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – II)
ST-332 : Theory of Estimation
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Use*** *of scientific calculator and statistical tables is* ***allowed****.*
iv) Symbols and abbreviations have their ***usual*** *meaning.*

1. Attempt **each** of the following :

a) In **each** of the following cases choose the **correct** alternative : (**1 each**)

i) Neymon's factorization theorem is applied for testing

A) Consistency

B) Sufficiency

C) Unbiasedness of an estimator

D) Asymptotic unbiasedness

ii) Sample mean is an estimator of population mean which is

A) biased and consistent

B) biased and not consistent

C) unbiased and consistent

D) unbiased and not consistent

iii) If $X \sim N(\mu, \sigma^2)$ where σ^2 is known then $I(\mu)$ is

A) $\frac{\mu}{\sigma^2}$ B) $\frac{1}{\sigma}$ C) $\frac{1}{\sigma^4}$ D) $\frac{1}{\sigma^2}$

iv) Pivotal quantity used for the construction of confidence interval for σ^2, in case of $N(\mu, \sigma^2)$ distribution follows.

A) normal distribution B) Chi-square distribution

C) t distribution D) F distribution

P.T.O.

b) In **each** of the following cases, state whether the given statement is **true** or **false** : (**1 each**)

i) Every m.l.e. is an unbiased estimator

ii) UMVUE is always MVBVE.

c) Explain the following terms : (**1 each**)

i) Estimator

ii) Relative efficiency of an estimator T, w.r.t. T_2.

d) Define the following terms : (**1 each**)

i) Confidence interval

ii) Consistent estimator.

2. Attempt **any two** of the following : (**5 each**)

a) Let $X_1, X_2, \ldots X_n$ be a random sample from $N(\mu, \sigma^2)$, with known mean μ . Find a constant C such that CT is an unbiased estimator of σ,

where $T = \frac{1}{n}\sum_{i=1}^{n} |X_i - \mu|$

b) State Pitman-Koopman form for existence of sufficient statistic of a parameter. Using it, obtain sufficient statistic for parameter λ of Poisson distribution.

c) Define Fisher's information function and state its use. Obtain information function $I(\alpha)$ for $G(\alpha, \lambda)$ distribution where λ is known.

3. Attempt **any two** of the following : (**5 each**)

a) Define uniformly minimum variance unbiased estimator (UMVUE) of a parameter. Show that UMVUE is unique when it exists.

b) On the basis of a random sample of size n from $N(\mu, \sigma^2)$, obtain $100(1-\alpha)$ % confidence interval for μ when σ^2 is unknown.

c) Let $X_1, X_2, \ldots, X_n$ be a random sample from $N(\mu, \sigma^2)$. Show that

$S^2 = \frac{\Sigma(X_i - \overline{X})^2}{n}$ is a consistent estimator of σ^2.

4. Attempt **any one** of the following :

a) (i) Define sufficient estimator of a parameter θ. Further show that :

I) If T is sufficient for θ, T is also sufficient for $\varphi(\theta)$.

II) If sufficient estimator exists, it is a function of m.l.e. **6**

(ii) Let $X_1, X_2, \ldots X_n$ be a random sample from $U(0, \theta)$ distribution. Obtain m.l.e. of θ. Verity whether it is unbiased. **4**

b) (i) Let $X_1, X_2, \ldots X_n$ be a random sample on a discrete r.v. X having p.m.f. as follows.

$$f(x, \theta) = \theta(1-\theta)^{x-1} \qquad x = 1, 2, \ldots$$

$$0 < \theta < 1$$

Show that $\overline{X}$ is unbiased estimator of $\frac{1}{\theta}$. Obtain Cramer-Rao bound for $v(\overline{x})$. **6**

ii) Explain the method of moments for estimation of parameters. Give one illustration. **4**

[4017] – 346

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – III)
ST - 333 : Statistical Process Control (Online Methods)
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions: i) All questions are ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Use*** *of scientific calculator and statistical tables is* ***allowed****.*
iv) Symbols and abbreviations have their ***usual*** *meaning.*

1. Attempt **each** of the following :

a) Choose the correct alternative in **each** of the following : **(1 each)**

i) Which of the following PC tools uses 80:20 principle ?

A) Pareto Diagram B) Histogram

C) Control Chart D) Check Sheet

ii) Process is said to be under control if

A) A point falls outside the control limits

B) A run of seven or more points is observed above or below the central line

C) There is a cycle or Linear trend

D) All the points are randomly distributed between LCL and UCL

iii) P-chart is used to control

A) Process average

B) Process standard deviation

C) Process fraction defective

D) No. of defects per unit

iv) For X-MR chart, $\overline{X} = 33.52$, $\overline{MR} = 0.48$, $d_2 = 1.128$, hence the UCL is

A) 33.52 B) 34.79

C) 32.24 D) 30.14

P.T.O.

b) State whether **each** of the following statements is **true** or **false** : **(1 each)**

i) The points out of the control units on R-chart are also considered while constructing $\overline{X}$ - chart.

ii) When process standard deviation σ is not known, it is estimated by $(\overline{R}/d_2)$.

c) Distinguish between :

i) On line process control methods and off line process control methods. 1

ii) Control charts - standards given and standards not given. 1

d) i) Explain the term "capability performance index C_{pk}". 1

ii) Give interpretation of "high spots" on C-chart. 1

2. Attempt **any two** of the following : **(5 each)**

a) Explain the construction of check sheet and interpretation of it.

b) Explain the construction of p-chart where control limits are based on average sample size. Also interpret high spots and low spots with respect to a p-chart.

c) For 25 samples of size 4, $\overline{\overline{X}} = 0.43$ and $\overline{R} = 0.01$. Obtain 3σ control limits. If the process average shifts to 0.435, calculate the probability of catching the shift on i) first sample after the shift, ii) second sample after the shift.

3. Attempt **any two** of the following : **(5 each)**

a) Explain the factors to be considered in determining subgroup size and frequency of sub groups in the construction of control charts for variables.

b) Define capability index C_p and iterpret the following :

i) $C_p = C_{pk}$

ii) $C_p > C_{pk}$

c) Explain the purpose and the uses of Statistical Process Control (S.P.C).

4. Attempt **any one** of the following :

a) i) Explain the construction of C chart when standards are not given. **(5)**

ii) Distinguish between chance causes and assignable causes of variation. **(5)**

b) i) Explain the following terms : **(5)**

i) Natural tolerance limits.

ii) Specification limits.

iii) Probability limits.

ii) Explain the concept of confirming run length chart (CRL). What is the distinction between CRL and p-chart ? **(5)**

[4017] – 347

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – IV)
ST-334 : Design of Experiments
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator and statistical tables is* ***allowed****.*
4) Symbols and abbreviations have their ***usual*** *meaning.*

1. Attempt **each** of the following :

a) In **each** of the following cases, choose the correct alternatives : **(1 each)**

i) In case of 4×4 LSD, total number of observations are

A) 32 B) 16 C) 64 D) 12

ii) In CRD, which of the following, is an unbiased estimator of error variance σ^2 ?

A) Error sum of squares B) Treatment sum of squares

C) Error mean sum of squares D) Treatment mean sum of squares

iii) In case of RBD with 5 treatments, if degrees of freedom for total S.S.are 19, then error d.f. are

A) 4 B) 3 C) 12 D) 11

iv) In 2^2 factorial experiment, expression for main effect A is given by

A) $\frac{1}{2}\{(ab)-(b)+(a)-(1)\}$ B) $\frac{1}{4}\{(ab)-(b)+(a)-(1)\}$

C) $\frac{1}{2}\{(ab)-(a)+(b)-(1)\}$ D) $\frac{1}{2}\{(ab)-(a)-(b)+(1)\}$

b) In **each** of the following cases, state whether the given statement is **true** or **false** : **(1 each)**

i) In RBD, number of plots in everyblock is some as number of treatments in the experiment.

ii) In 2^3 factorial experiment, interaction BC is a treatment contrast.

P.T.O.

c) Define the following terms : **(1 each)**

i) Treatment.

ii) Experimental error.

d) i) State any one advantage of RBD. **1**

ii) State any one method of executing local control. **1**

2. Attempt **any two** of the following : **(5 each)**

a) Explain , in brief, the principle of randomisation. How is it used in RBD ?

b) State the mathematical model used in CRD with underlying assumptions. Also obtain least square estimate of treatment effect.

c) Explain split plot design giving one example. Also give layout.

3. Attempt **any two** of the following : **(5 each)**

a) In case of LSD, explain the procedure of testing hypothesis of equality of row means giving justification.

b) Obtain efficiency of RBD over corresponding CRD if the following information is available.

Total S.S. = 901.19, Block S.S. = 219.43

Treat d.f. = 5, Block d.f. = 3

Error mean S.S. = 15.3.

c) What is analysis of covariance ? Give one real life situation where analysis of covariance is used. State the expressions for the least square estimators of the parameters involved in the mathematical model of analysis of covariance in RBD.

4. Attempt **any one** of the following :

a) i) In case of 2^3 factorial experiment, obtain the expression for interaction AB. **5**

ii) Explain Yate's procedure to obtain factorial effects in 2^3 factorial experiment. **5**

b) i) What is meant by confounding in factorial experiment ? Explain the concepts of total and partial confounding by giving one illustration of each. **5**

ii) Write a note on Kruskal Wallis H test. **5**

[4017] – 349

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – VI)
ST 336 (A) : Operations Management
(2008 Pattern) (New Course)

Time: 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of Scientific calculators and statistical tables is* ***allowed****.*
4) Symbols and abbreviations have their ***usual*** *meanings.*

1. Attempt **each** of the following :

a) In each of the following cases choose the correct alternative (**1 each**) :

i) Which of these is not correct ?

A) PERT is probabilistic in nature.

B) CPM is deterministic in nature.

C) CPM is event oriented.

D) CPM and PERT use similar terminology, but were developed independently.

ii) Which of these is a correct statement ?

A) Each value in a pay-off table is conditional in the sense that it is associated with the adoption of a certain strategy and happening of a particular event.

B) A decision making situation with five possible states of nature and six courses of action will involve a total of eleven possible pay-offs.

C) A pay-off table always involves profits.

D) Every decision making situation involves an equal number of courses of action and events.

iii) In ABC analysis 'A' type of items are those which have

A) Low usage value

B) Low unit price

C) High usage value large in number

D) High usage value, small in number

iv) Which of these is a correct relationship between independent float (I_F), free float (F_F) and total float (T_F).

A) $T_F \leq I_F \leq F_F$ B) $I_F \leq F_F \leq T_F$

C) $F_F \leq I_F \leq T_F$ D) $I_F \leq T_F \leq F_F$

b) In each of the following cases, state whether the given statement is **true** (T) or **false** (F) : (**1 each**)

i) In PERT expected time is the weighted mean of three different time estimates.

ii) The duration of an activity can be reduced below its crash time by allocating more resources than originally planned.

c) Define **each** of the following : (**1 each**)

i) Critical path

ii) Cost slope of an activity.

d) i) State minimax criterion of decision making.

ii) State the formula for economic order quantity in an inventory model with uniform rate of demand, finite replenishment, when shortages are allowed.

2. Attempt **any two** of the following : (**5 each**)

a) The following table lists the jobs of a project with their time estimater.

Job (i–j)	**1–2**	**1–6**	**2–3**	**2–4**	**3–5**	**4–5**	**6–7**	**5–8**	**7–8**
$\mathbf{t_0}$	3	2	6	2	5	3	3	1	4
$\mathbf{t_m}$	6	5	12	5	11	6	9	4	19
$\mathbf{t_p}$	15	14	30	8	17	15	27	7	28

i) Draw the project network.

ii) Find the expected time and variance for each activity.

b) Write a short note on ABC analysis.

c) An electro-mechanical equipment has a purchase price of Rs. 7,000. Its running costs per year and resale values are given below :

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Running Cost Rs.	2000	2100	2300	2600	3000	3500	4100	4600
Resale value Rs.	4000	3000	2200	1600	1400	700	700	700

Determine optimal replacement time.

3. Attempt **any two** of the following : (**5 each**)

a) For the project consisting of the following activities, calculate earliest and latest times at each node. Hence identify the critical path. Also determine project duration.

Activity	1–2	1–3	1–4	2–3	2–4	2–5	3–5	4–5
Duration (Days)	5	4	6	7	8	10	11	10

b) A company dealing with newly invented telephonic device is faced with the problem of selecting the following strategies :

i) manufacture the device itself,

ii) to be paid on a royalty basis by another manufacturer,

iii) sell the rights for its invention for a lump sum.

The profits in thousands of rupees that can be expected in each case and the probabilities associated with the sales volume are as below :

Event	**Probability**	**Manufacture itself**	**Royalty**	**Sell the rights**
High Demand	0.2	100	40	20
Medium Demand	0.3	30	25	20
Low Demand	0.5	-10	15	20

Construct the decision tree and find the optimal strategy.

c) Derive an expression for economic lot size with uniform rate of demand, finite replenishment with no shortages.

4. Attempt **any one** of the following :

a) The following table gives data on normal time and cost, crash time and cost for a project.

Activity	Normal		Crash	
	Time (Days)	Cost (Rs)	Time (Days)	Cost (Rs)
1–2	8	100	6	200
1–3	4	150	2	350
2–4	2	50	1	90
2–5	10	100	5	400
3–4	5	100	1	200
4–5	3	80	1	400

Indirect cost is Rs. 70/- per day. Draw project network and determine critical path. Crash upto 2 stages systematically the activities and determine project duration. **10**

b) i) A manufacturer has to supply 12000 units of a product per year to his customer. The demand is fixed and known and the shortage cost is assumed to be infinite. The inventory holding cost is Re 0.20 per unit per month and the set up cost per run is Rs. 350/-. Determine i) the optimum run size ii) optimum scheduling period and iii) minimum total variable yearly cost. **7**

ii) Define :

i) Total float ii) Free float iii) Independent float. **3**

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[4017] – 349

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – VI)
ST – 336 (B) : Actuarial Statistics
(2008 Pattern) (New Course)

Time: 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Use*** *of Scientific calculator and statistical table is* ***allowed****.*

4) Symbols and abbreviations have their ***usual*** *meanings.*

1. a) In each of the following cases, choose correct alternative : **(1 each)**

i) If S(x) is a survival function at age x then $s(\infty)$ is

A) 1 B) 0 C) ∞ D) $-\infty$

ii) For annuity certain the present value of $\ddot{a}_{\overline{n}|}$ is

A) $\frac{1-v^n}{d}$ B) $\frac{v^n-1}{d}$

C) $\frac{1-v^n}{n}$ D) $\frac{1-v^d}{n}$

iii) If δ is constant force of interest then it is given by

A) – v B) log v

C) e^v D) –log v

iv) The relationship between T_x and L_x is

A) $T_x = L_x + L_{x+1}$

B) $T_x = L_x + T_{x+1}$

C) $T_x = L_x - T_{x+1}$

D) $T_x = L_x - L_{x+1}$

b) In each of the following cases, state whether the given statement is **true** or **false** : (**1 each**)

i) In insurance the two parties reach on an agreement provided utility function of any one party is non-decreasing and concave.

ii) The force of mortality at age x is given by $-\frac{s'(x)}{s(x)}$.

c) Explain **each** of the following terms : (**1 each**)

i) Insurer

ii) Deferred annuity

d) Explain the meaning of the following symbols : (**1 each**)

i) $A_x = \frac{1}{\overline{n}|}$

ii) $\overline{P}(\overline{A}_x)$

2. Attempt **any two** of the following : (**5 each**)

a) Explain role of an actuary in 'Insurance Business'.

b) Find amount of Rs. 10,000/- due after 10 years with

i) 5% as force of interest

ii) 5% as effective rate of interest

iii) 5% nominal rate of interest payable quarterly.

c) Explain the term 'annuity'. If for the annuity certain, the payments are made at the beginning of year in each year for the period of n years then show that

$$\ddot{S}_{\overline{n}|} = (1+i)^n \ddot{a}_{\overline{n}|}$$

3. Attempt **any two** of the following : **(5 each)**

a) Define curtate future life time random variable K(x) and find its probability mass function. (p.m.f.).

b) Given that

$$S(x) = 1 - \frac{x^2}{100}; \quad 0 \le x \le 10$$
$$= 0 \quad ; \text{ otherwise}$$

Find : i) ${}_tP_4$

ii) ${}_2/_2q_4$

iii) probability density function of T(4)

iv) median future life time.

c) For a certain population, mortality rates q_x are as follows :

Age in years (x)	0	1	2	3	4	5
$\mathbf{q_x}$	0.15	0.20	0.60	.50	0.80	1.00

i) construct the columns l_x, L_x and T_x for a radix of 10,0000.

ii) What is the probability that an individual from radix will survive at least 3 years ?

4. Attempt **any one** of the following :

a) I) The probability density function (p.d.f.) of future life time T for (x) is

$$g(t) = \frac{1}{80}; \quad 0 \le t \le 80$$
$$= 0 \; ; \text{ otherwise}$$

At the force of interest δ=0.05, for a whole life insurance of a unit amount issued to (x).

Calculate i) the net single premium

ii) variance of present value random variable z. **5**

II) With usual notations, show that

$$\text{Var}(L) = \left(1 + \frac{\bar{P}}{\delta}\right)^2 \text{var}(z)$$ **5**

b) I) Explain in brief : **6**

i) n year term insurance

ii) whole life insurance

iii) n year endowment insurance

State and explain the expressions for net single premiums in terms of v for each of the above insurance schemes.

II) A decision maker's utility function is given by $u(w) = \sqrt{w}$. The decision maker has wealth of w = 10 units and faces a random loss x with a uniform distribution on (0, 10). What is the maximum amount this decision maker will pay for complete insurance against random loss ? **4**

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[4017] – 349

T.Y. B.Sc. (Semester – III) Examination, 2011
STATISTICS (Principal) (Paper – VI)
ST – 336 (C) : Time Series Analysis
(2008 Pattern) (New Course)

Time: 2 Hours Max. Marks : 40

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Use*** *of Scientific calculator and statistical table is* ***allowed****.*

4) Symbols and abbreviations have their ***usual*** *meanings.*

1. a) Attempt **each** of the following :

Choose the correct alternatives, in **each** of the following : (**1 each**)

i) Under additive model trend T is eliminated from time series Y_t by

A) $\frac{Y_t}{T}$ B) $Y_t.T$ C) $Y_t - T$ D) $Y_t + T$

ii) Box-Cox transformation is

A) $\frac{y^{\lambda}-1}{\lambda}\lambda > 1$ B) $\frac{y^{\lambda}-1}{\lambda}\lambda < 1$

C) $\frac{y^{\lambda}-1}{\lambda}\lambda \neq 1$ D) None of these

iii) Under Ax(2) model, if $\sigma_e^2 = 100$ for 25 number of observations then residual sum of squares is

A) 4 B) 2.5 C) 900 D) None of these

iv) In time series, the type of smoothing relationship is

A) $\hat{y}_t = (1-\alpha)\hat{y}_{t-1} + a$ B) $\hat{y}_t = (1-\alpha)\hat{y}_{t-1} + \alpha Y_{t-1}\ \alpha \in R$

C) $\hat{y}_t = (1-\alpha)\hat{y}_{t-1} + \alpha Y_{t+1}\ \alpha \in R$ D) $\hat{y}_t = (1-\alpha)\hat{y}_{t-1} + \alpha Y_{t-1}\ \alpha \in (0,1)$

b) State whether **each** of the following statement is **true** or **false** (**1 each**)

i) Divided differencing is used to transform nonstationary time series to stationery time series.

ii) Method of selected points used points at equidistant.

c) Define :

i) Seasonal variation : Give one illustration. **(1)**

ii) Exponential smoothing. **(1)**

d) i) State the relationship used in double exponential smoothing. **(1)**

ii) State AR (2) model. **(1)**

2. Attempt **any two** of the following : (**5 each**)

a) Explain the concept of moving averages. Also mention its merits and demerits.

b) The table below gives yearwise profit of a firm, using simple exponential smothing method with $\alpha = 0.1$, obtain the trend estimate for the year 2015.

Year :	2002	2003	2004	2005	2006	2007	2008	2009	2010
Profit (in '000 Rs) :	120.6	116.4	138.3	132.6	1.30.6	125.5	1.36.5	142.1	150.3.

c) Explain in brief the method of differencing. Also mention its usefulness.

3. Attempt **any two** of the following : (**5 each**)

a) What are non-parametric tests used in analysis of time series ? Explain in brief in any one.

b) Given n=20, $\Sigma t = 163$, $\Sigma t^2 = 1946$, $\Sigma t.y_t = 889.37$, $\Sigma y_t = 186.32$, $\Sigma y_t^2 = 2586.32$. Fit a linear trend by method of least squares. Interprete the result obtained.

c) Explain the use of transformation in time series. Explain any one type of transformation.

4. Attempt **any one** of the following :

a) i) Explain the Durbin-Watson test procedure. **7**

ii) Explain the utility of time series plots. **3**

OR

b) i) Write a note on Box-Jenkin technique. **6**

ii) Define auto correlation function. Also state its uses. **4**

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[4017] – 350

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – I) (New)
Gg 331 : Principles and Techniques of Watershed Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and Maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of Maps Stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **(10)**
   a) Define Watershed Management.
   b) List any two problems in Watershed Management.
   c) What is meant by catchment area ?
   d) Define infiltration.
   e) Name the types of Watershed according to shape.
   f) What are the sub-cycles of a Hydrological cycle ?
   g) What is area of a sub-catchment ?
   h) What do you mean by Autochthonus rivers ?
   i) What is the size of a micro Watershed ?
   j) State the objectives of the land capability classification.

2. Write short answers **(any two)** : **(10)**
   a) Describe the applicability of USLE.
   b) Explain the factors affecting the erodibility of soils.
   c) Describe the process of interception.

3. Write short notes (**any two**) : **(10)**
   a) Role of Surface Runoff in Watershed.
   b) Land capability classes.
   c) Aerial aspects of Watershed.

4. Describe the principles and objectives of Watershed Management. **(10)**

   OR

   Describe the physical and hydrological characteristics of soils in a Watershed.

[4017] – 351

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – II)
Gg. 332 : Geography of Travel and Tourism (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory.***
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of map stencils is* ***allowed.***

1. Answer the following questions in **one** or **two** sentences : **10**

   a) State any two elements of dynamic tourism.

   b) What is a summer resort ?

   c) What is meant by relative location ?

   d) Define the concept of Intervening opportunity.

   e) State any two impact of slope on tourism.

   f) Who is the international Tourist ?

   g) Define the concept of market accessibility.

   h) What is national culture ?

   i) Mention any two-hill stations from Maharashtra.

   j) Mention any two national Parks of India.

2. Write short answers (**any two**) : **10**

   a) Discuss reasonability of tourism.

   b) Differentiate between national and international tourism.

   c) Describe the impact of visitor density.

P.T.O.

3. Write short notes (**any two**) : **10**

   a) Manmade objects as tourist attractions.

   b) Purpose of travel.

   c) National culture and heritage preservation.

4. Explain the historical and cultural factors affecting tourism. **10**

   OR

4. Explain the importance of tourism as regional resources. Substantiate your answer with suitable examples.

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[4017] – 352

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – III)
Gg-333 : Fundamentals of Geoinformatics Paper – I (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Diagrams and maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**
   a) Differentiate between data and information.
   b) Define Geoinformatics.
   c) What is spatial data ?
   d) Name any two components of GIS.
   e) State any two functions of GIS.
   f) What is arrtibute data ?
   g) What is raster data ?
   h) Name any two data sources in GIS.
   i) What do you understand by resolution ?
   j) What is DTM ?
2. Write short answers **(any two)** : **10**
   a) Explain query analysis as a GIS task
   b) Explain how satellite images are data source in GIS
   c) Distinguish between spatial and non spatial data.
3. Write short notes **(any two)** : **10**
   a) Modelling surfaces
   b) Aerial photographs
   c) Input as a GIS task.
4. Discuss the applications of RS and GIS in urban studies.

   OR

   Give a comparative account of raster and vector data models in GIS. **10**

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[4017] – 353

T.Y.B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – IV)
Gg – 334 : India – A Geographical Study
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

N.B.**: 1) **All** questions are **compulsory.
*2) Figures to the **right** indicate **full** marks.*
*3) Diagrams and Maps must be drawn **wherever** necessary.*
*4) Use of Maps Stencils is **allowed**.*

1. Answer the following questions in **one** or **two** sentences : **10**
   a) With which country does India share the longest land border ?
   b) Name two states where the Archaean Rock systems are predominant.
   c) What is the Terai Region ?
   d) Name two West Flowing rivers.
   e) Name two areas experiencing very heavy rainfall.
   f) State two regions important for Littoral forests.
   g) What is Desertification ?
   h) State two regions important for Regur soils.
   i) State two species of coniferous forests commonly found in India.
   j) Name two regions affected by floods regularly.

2. Write short answers (**any two**): **10**
   a) The characteristics of the Himalayan River Systems.
   b) Explain the mechanism of the Indian Monsoon.
   c) The problem of Deforestation in India.

3. Write short notes (**any two**): **10**
   a) Drought-prone areas of India.
   b) Soil conservation.
   c) Gondwana system.

4. Divide India into Major physiographic Regions and discuss the Northern Mountains in detail. **10**

   OR

   Discuss the major Forest Types in India and their economic importance.

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[4017] – 354

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – V)
Gg. 335 : Geography of soils (Paper – I)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) Diagrams and maps must be drawn ***wherever*** *necessary.*
4) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences.

   a) Define soil moisture.

   b) What do you understand by the process of leaching ?

   c) Define wilting point.

   d) What is zonal soil ?

   e) What is soil colour ?

   f) Define cation.

   g) Define mineral.

   h) What is soil porosity ?

   i) Define reduction.

   j) What is field capacity ? **10**

2. Write short answers (**any two**) :

   a) Describe the process of nitrogen fixation.

   b) Describe the genetic structure of soil.

   c) Distinguish between zonal and azonal soils. **10**

P.T.O.

3. Write short notes (**any two**) :

   a) Classification of tropical soils.

   b) Pedology.

   c) Redox potential. **10**

4. Describe the brief history of soil science.

   OR

   Give an account of soil profile development. **10**

[4017] – 355

T.Y. B.Sc. (Semester – III) Examination, 2011
GEOGRAPHY (Paper – VI)
Gg.336 : Fundamentals of Geoinformatics (Paper – II)
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Diagrams and maps must be drawn **wherever** necessary.*
*4) Use of map stencils is **allowed**.*

1. Answer the following questions in **one** or **two** sentences : **10**

a) What is Electromagnetic radiation ?

b) What are IR colour photos ?

c) State the formula to express speed of light.

d) What is scattering ?

e) What is a unit of wavelength measurement ?

f) Mention types of aerial cameras.

g) What is a principal point on an aerial photograph ?

h) What is side lap ?

i) What is reflected IR ?

j) What is adsorption ?

2. Write short answers **(any two)** : **10**

a) Explain the processes involved in atmospheric interaction and radiation.

b) Describe the uses of vertical aerial photograph.

c) Explain the types of scattering.

P.T.O.

3. Write short notes (**any two**) : **10**

   a) Science of remote sensing.

   b) Division of electromagnetic spectrum in various spectral regions.

   c) Stereograms.

4. Describe geometry of an aerial photograph. **10**

   OR

   Discuss various applications of remote sensing.

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[4017] – 356

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY (Paper – I) (New Course)
MB-331 : Medical Microbiology – I (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) Draw neat, labelled diagram **wherever** necessary.*

1. A) Match the following : **5**

[A]	**[B]**
i) Salpingitis	a) Gall bladder
ii) Proctitis	b) Bone marrow
iii) Cellulitis	c) Subcutaneous tissue
iv) Cholecystitis	d) Rectum
v) Osteomyelitis	e) Fallopian tube

B) Attempt the following : **5**

i) Kupffer cells are present in liver. State True or false.

ii) In concurrent parallel study, comparisons are made between two randomly assigned groups. State–True or false.

iii) Define epidemiology.

iv) Enlist two diseases with causative agents in genital system.

v) Enlist types of randomized control trial.

P.T.O.

2. Write short notes on **any two** : **10**

   A) Pathogenesis of Pseudomonas in Surgical sepsis.

   B) Reservoirs of infection.

   C) Pathogenecity of Enteroinvasive E.Coli.

3. Attempt **any two** : **10**

   A) Give the classification of streptococci.

   B) Enlist bacterial and viral diseases of central nervous system with causative agents.

   C) Elaborate defence mechanisms in Respiratory system.

4. Attempt **any one** : **10**

   A) Describe pathogenesis and pathogenecity of gas gangrene.

   B) Explain Laboratory diagnosis of pulmonary tuberculosis.

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[4017] – 358

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY(Paper – III)
MB-333 : Enzymology (New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) Draw ***neat*** *labelled diagrams* ***wherever*** *necessary.*

1. Do as directed : **(10)**

a) Fill in the blanks.

i) Substrate analogue of Chymotrypsin is _____.

ii) The coenzyme form of folic acid is _____.

iii) Allosteric enzymes show _____ shaped curve.

iv) Lactate dehydrogenase exists in _____ and _____ forms.

b) State **true** or **false** :

i) In simple non-competitive inhibition K_m and V_m decreases.

ii) Lineweaver Burke equation is given as

$$\frac{1}{V} = \frac{V_m}{K_m}\ \frac{1}{[S]} + V_m$$

c) Define the following :

i) Isozyme.

ii) Katal.

iii) Ligand.

d) Give principle of ultracentrifugation.

P.T.O.

2. Attempt the following **(any two)** : **(10)**

   a) Explain the role of thiamine as a coenzyme.

   b) Explain enzyme assay by Manometric method.

   c) Explain salt precipitation.

3. Attempt the following **(any two)** : **(10)**

   a) Explain use of SDS-PAGE for determination of molecular weight of proteins.

   b) Explain immobilization of enzymes by cross-linking.

   c) Explain any one method of purification of proteins based on specific binding.

4. Attempt the following **(any one)** : **(10)**

   a) Derive equation for uncompetitive inhibition.

   b) Explain pyruvate dehydrogenase as a multienzyme complex.

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[4017] – 359

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY (Paper – IV)
MB – 334 : Immunology – I (New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory.***
*2) **All** questions carry **equal** marks.*
*3) Draw neat labelled diagrams **wherever** necessary.*

1. A) Match the following and rewrite :

1) Inflammation	A) Partial antigen
2) Widal test	B) Histamine
3) Hapten	C) Fab locus
4) Antigen binding	D) Antitoxin
5) Passive immunity	E) Typhoid

B) State **true** or **false** :

1) Blood group antigens are the examples of autoantigens.

2) Light chain of antibody molecule consists of 2/4 amino-acids ?

3) Mast cells play an important role in antibodies production.

4) Weil-Felix test is used for diagnosis of rickettsial diseases.

5) Plasma cells are involved in secretion of antibodies.

P.T.O.

2. Write short notes on **any two** :

   A) Phagocytosis

   B) Adjuvants

   C) Dendritic cells.

3. Attempt **any two** :

   A) Diagrammatically illustrate structure of ‘thymus’.

   B) Applications of monoclonal antibodies.

   C) Western blot technique.

4. Define antigen and discuss various factors affecting immunogenicity.

   OR

   What is complement ? Describe classical pathway of complement activation.

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[4017] – 360

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY (Paper – V) (New Course)
MB – 335 : Fermentation Technology – I (2008 Pattern)

Time : 2 Hours | Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory.***
*2) **All** questions carry **equal** marks.*
*3) Draw **neat** labelled diagrams **wherever** necessary.*

1. A) Answer the following : **5**

i) Define secondary metabolite.

ii) Define Thermistors.

iii) Define scale up of fermentation process.

iv) Define shelf life of a product.

v) 'LAL' test is used to detect the presence of _____.

B) Match the following : **5**

1) Kinoshita	a) DEAE cellulose
2) Carcinogenicity	b) Ultrasonication
3) Dummy variable	c) Glutamic acid producer
4) Ion exchange resin	d) Ames test
5) Cell disruption	e) Plackett Burman design

2. Attempt **any two** of the following : **10**

a) Describe the significance of pilot plant in scale up of fermentation process.

b) How ion exchange chromatography is useful in down stream processing ?

c) How sterility testing of a pharmaceutical product is carried out ?

P.T.O.

3. Attempt **any two** of the following : **10**

   a) Describe recurring expenditure with respect to fermentation economics.

   b) Describe a method for monitoring the foam in a fermentation process.

   c) How analogue resistant mutants are selected ?

4. Attempt **any one** : **10**

   a) Enlist the objectives of strain improvement and describe different methods used for selection of auxotrophic mutants.

   b) Enlist various methods used for detection of fermentation products and describe end point determination assay.

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[4017] – 361

T.Y. B.Sc. (Semester – III) Examination, 2011
MICROBIOLOGY (Paper – VI) (New Course)
MB – 336 : Food and Dairy Microbiology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i) **All** questions are **compulsory**.*
*ii) **All** questions carry **equal** marks.*
*iii) Draw **neat** labelled diagrams **wherever** necessary.*

1. Answer the following : **10**
   a) Define blanching.
   b) Define clean milk.
   c) Give the causative agent of ropiness in milk.
   d) Give the temperature used in LTH method of pasteurisation.
   e) Name any two intrinsic factors affecting microbial growth in food.
   f) Define 'D' value.
   g) Define probiotics.
   h) Give the use of tetrapac in food industry.
   i) State the mechanism of action of salt in food preservation.
   j) State True or False. Phosphatase is inactivated at pasteurisation temperature.

2. Attempt the following (**any two**) : **10**
   a) Describe the Dye reduction test using methylene blue for microbial analysis of milk.
   b) Describe the role of antibiotics in food preservation.
   c) Describe the spoilage of fruits and vegetables.

P.T.O.

3. Attempt the following **(any two)** : **10**

   a) Give significance of fermented foods.

   b) Describe Salmonella food infection with respect to sources and prevention.

   c) Define milk. Describe various types of milk.

4. Attempt **any one** of the following : **10**

   a) Describe succession of microorganisms in milk leading to spoilage. Add a note on colour and flavour defects.

   b) Describe staphylococcal food poisoning with respect to sources and prevention.

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[4017] – 362

T.Y. B.Sc. (Semester – III) Examination, 2011
Electronics Science (Paper – I)
EL-331 : ADVANCED DIGITAL SYSTEMS DESIGN
(New) (2008 Pattern)

Time : 2 Hours | Max. Marks : 40

N.B. : *i) **All** questions are **compulsory**.*
*ii) Figures to **right** indicate **full** marks.*
*iii) Draw neat diagrams **wherever** necessary.*

1. **All** sub-questions are **compulsory**.

1) Define state compatibility. **1**

2) What is non critical race ? **1**

3) List two basic classes of FPGA. **1**

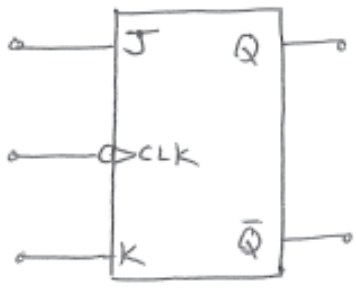
4) State one application of VHDL. **1**

5) "Reduction of equivalent states is desirable". Comment. **2**

6) "Designing of asynchronous sequential machine is difficult". Comment. **2**

7) Interpret each of following PAL device numbers PAL 12H6 and PAL 10P8. **2**

8) Write the entity declaration for the given flipflop. **2**



P.T.O.

2. Answer **any two** of the following :

   a) Write various steps to design a modern digital system. **4**

   b) State the use of implication chart. Explain the procedure, how implication chart is used for equivalent state reduction with suitable state table. **4**

   c) Explain flow table and primitive flow table with examples. When the transition table can be used as flow table ? **4**

3. Answer **any two** of the following :

   a) Explain CPLD with suitable diagram. **4**

   b) Describe how cycles occurs in asynchronous sequential machine. What is main objective of state assignment technique in case of asynchronous sequential machine ? **4**

   c) Explain various ASM symbols. **4**

4. Answer **any two** of the following :

   a) Explain, working of stepper motor sequence generator with the help of Block diagram. **6**

   b) What are the main problems in designing of asynchronous sequential machine ? Explain mixed operating mode technique with diagram. **6**

   c) i) Compare fundamental mode asynchronous sequential machine with pulse mode asynchronous sequential machine. **6**

   ii) Write a short note on SPLD.

OR

4. Answer the following :

   a) A combinational Logic is given by the functions **4**

   $Z_1 = A\overline{B}\overline{C} + ABC + A\overline{C}$

   $Z_2 = B\overline{C} + \overline{A}\overline{B}\overline{C}$

   $Z_3 = B + A + \overline{A}\,\overline{C}$

   Design the circuit with PLA.

b) Write the program in VHDL for 4 to 1 multiplexer using Data flow modeling. **4**

c) Find the compatible states using merger graph. **4**

Present State	Next State/Output			
	00	01	10	11
A	C/0	–/–	A/0	–/–
B	–/–	E/0	B/0	D/1
C	D/0	B/1	–/–	–/–
D	C/0	A/1	E/0	–/–
E	B/0	–/–	A/0	E/1

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[4017] – 363

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONICS SCIENCE (Paper – II)
EL – 332 : Microcontrollers
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of calculator is* ***allowed****.*

1. Answer **all** of the folowing :

a) State the area of scratch-pad RAM in 8051 μc. **1**

b) What is the range of clock frequency of 8051 μc ? **1**

c) With X_{TAL} = 11.0592 MHz, what hex value should be loaded into TH1 to have 2400 baud rate ? **2**

d) List the derivatives of 8051 μc family. **1**

e) State the addressing mode of instruction MOVC A, @ A + DPTR **1**

f) If A = 05 H, B = 07 H, then after execution of the instruction MUL AB, whatwill be the content of A and B ? **2**

g) What is simulator ? Explain its importance in code development. **2**

h) Why the current drivers are required in interfacing stepper plotor to 8051 μc ? **2**

2. Answer **any two** of the following :

a) Draw the internal architecture of 8051 μc and explain its features. **4**

b) Explain PSW register of 8051μc. **4**

c) List the different addressing modes of 8051μc and explain any two with one example of each. **4**

P.T.O.

3. Answer **any two** of the following :

   a) With suitable diagram, explain operation of timer in mode 2 for 8051 μc. **4**

   b) Write note on Assembler and Editor used for 8051 μc programming. **4**

   c) Write a program to copy block of 20 bytes of data from RAM location starting at 45 H to RAM location starting at 65 H. **4**

4. Answer **any two** of the following :

   a) Interface 8K byte RAM to 8051 μc. Give its memory map. **6**

   b) Interface ADC to 8051 μc using port P_0. Write a program to read data from ADC and send it to port P_2. **6**

   c) Assume an oscillator running at 12 MHz controls 8051 μc. Write a subroutine to create a time delay of 20 ms. **6**

OR

4. Answer **all** of the following :

   a) Calculate the time required to execute the following instructions if the crystal frequency is 11.0592 MHz

      i) CLR A

      ii) LJMP 3000 H

      iii) MOV R_2,A

      iv) ADD A, # 95 H **4**

   b) Write a program to compare the contents of A with the contents of 20 H. If contents are equal, store 00 H in 21 H, else store FFH in 21 H. **4**

   c) Explain the instructions PUSH and POP with suitable example. **4**

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[4017] – 364

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONICS SCIENCE (Paper – III)
EL-333 : Analog System Design and Applications of Linear IC's
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Neat** diagrams must be drawn **wherever** necessary.*

1. Attempt **all** of the following :

a) What are the advantages of guarding techniques ? **1**

b) List the applications of peak detector circuit. **1**

c) What modification is required to improve the stability of practical integrator circuit ? **1**

d) State any two applications of V to F converter. **1**

e) Compare twisted cable with co-axial cable. **2**

f) What are the important factors for selection of a linear IC ? **2**

g) State any two advantages of active filter over a passive filter. **2**

h) What will be the gain of OPAMP IC 741 having a bandwidth of 500 kHz. **2**

2. Attempt **any two** of the following :

a) Explain the working of an astable multivibrator using OPAMP. **4**

b) Draw and explain the circuit diagram for practical differentiator. Write designing steps for it. **4**

c) Draw and explain a practical S/H circuit. State its applications. **4**

3. Attempt **any two** of the following :

   a) Design and draw a neat circuit diagram of the inverting amplifier using OPAMP IC 741. **4**

   b) Explain the working of monostable multivibrator using timer IC 555. **4**

   c) Draw and explain a circuit diagram for high voltage regulator using IC 723. **4**

4. Answer **any two** of the following :

   a) Explain the working of log amplifier using BJT as a log element. Derive an expression for the output voltage. **6**

   b) Draw and explain a circuit diagram of a function generator using IC 8038. Give the important features of IC 8038. **6**

   c) Draw a circuit diagram of adjustable voltage regulator using IC LM 317 and derive an expression for the output voltage. **6**

OR

4. Answer **all** of the following :

   a) In a monostable multivibrator using OPAMP IC 741, calculate the time for quasi-stable state. Given $R_1 = 1k\Omega$, $R_2 = 9\ k\Omega$, $C = 0.1\mu F$ and $R = 2.2\ k\Omega$. **4**

   b) Design an adjustable voltage regulator using IC LM 317 for the output voltage, $V_0 = 5$ to 12 V. **4**

   c) For VCO circuit using IC 566, determine the nominal frequency of output waveform. Given +V = 12 V, $V_c = 9$ V, $R_1 = 10\ K\Omega$ and $C_1 = 0.001\ \mu F$. **4**

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[4017] –365

T.Y. B.Sc. (Semester – III) Examination, 2011
ELECTRONICS SCIENCE (Paper – IV)
EL – 334 : Foundations of Nanoelectronics (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***N.B.**: 1) **All** questions are **compulsory**.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*
*4) Log table / calculator is **allowed**.*

Given : Mass of neutron = 1.676×10^{-27} Kg.

Plarek's constant = 6.625×10^{-34} Js

1. Attempt **all** of the following:

a) What is Top-down approach in nanoelectronics ? **1**

b) What is statistical mechanics ? **1**

c) Write the equation of continuity. **1**

d) What is flash memory ? **1**

e) Write any four applications of nanotechnology. **2**

f) Define elastic and inelastic collision. **2**

g) What is polarization ? State its types. **2**

h) What is quantum wire ? **2**

2. Attempt **any two** of the following:

a) Obtain schrödinger time dependent equation for free particle. **4**

b) Explain Fermi – Dirac probability distribution function. **4**

c) Obtain an expression for motion of charged particle in an electromagnetic field. **4**

P.T.O.

3. Attempt **any two** of the following:

   a) Explain length scale of electrons in solids. **4**

   b) State Maxwell's equations. Write Maxwell's equations in integral and differential form. **4**

   c) Explain current voltage characteristics of resonant tunneling diode. **4**

4. Attempt **any two** of the following:

   a) What is quantum dot ? Explain electron transport in quantum dot. **6**

   b) Then EM wave is incident normally at the interface of two non-conducting media, show that $R_n = \left(\frac{n_1 - n_2}{n_1 + n_2}\right)^2$ and $T_n = \frac{4n_1 n_2}{(n_1+n_2)^2}$. **6**

   c) i) State and explain Pauli's exclusion principle. **3**

   ii) Explain importance of nanotechnology. **3**

OR

4. Attempt **all** of the following:

   a) Find the de-Broglie wavelength of neutron having energy leV. **4**

   b) An electron has speed of 2×10^4 cm/s accurate to 0.01%. What is uncertainty in the position of electron ? (Given : Mass of electron = 9.11×10^{-31} (kg) **4**

   c) Determine phase velocity of plane wave at frequency 10 GH_z in polyethelene

   (Given : $\mu = \mu_0, \in_r = 2.3\, \sigma = 2.56\times10^{-4}\,\text{mho/m}$). **4**

[4017] – 368

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – I)
DS – 331 : Science, Technology and National Security
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   1) Define 'National Security'.
   2) What is IT ?
   3) Define 'warfare'.
   4) Define 'Airpower'.
   5) Define 'Technology'.
   6) What is RMA ?
   7) What is ECCM ?
   8) What is AWACS ?

2. Answer in **8** to **10** sentences **each** (**any two**) : **(8)**
   1) Develop relationship between Science and Society.
   2) Make an evolution of Science and Technology.
   3) Write the significance of Military Technology.

3. Write short notes on **(any two)** : **(8)**
   1) Promising Military Technologies.
   2) Information warfare.
   3) Space warfare.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Why new Military Technologies are necessary for defence preparedness ? Justify.
   2) Explain the development trends in defence material.

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[4017] – 369

T.Y.B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – II)
DS 332 : Defence Economics (New)
(2008 Pattern)

Time : 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer in **2** or **4** sentences **each** : **16**

   1) Which economic system adopted by India ?

   2) What do you understand by 'Defence Expenditure" ?

   3) State the meaning of G.D.P.

   4) Define "Economic Warfare".

   5) What do you mean by wartime economy ?

   6) State the meaning of price control.

   7) What do you mean by P.A.C. ?

   8) What do you understand by Ideology ?

2. Answer in **8** to **10** sentences (**any two**) : **8**

   1) Write few lines on "Indian Economy".

   2) Explain the concept of "Rationing".

   3) Write in short the difference between planning and programming.

P.T.O.

3. Write short notes on (**any two**) : **8**

   1) Any one determinant of defence expenditure.

   2) Concept of defence Budget.

   3) War Finance.

4. Answer in **16** to **20** sentences (**any one**) : **8**

   1) How Indian parliament controls over defence budget ?

   2) Write in brief “Economic warfare”.

[4017] – 371

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – IV) (New)
DS – 334 : Research Methodology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i) **All** questions are **compulsory**.*
*ii) Figures to the **right** indicate marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   1) Define 'Research'.
   2) What is conceptualisation ?
   3) What is observation method ?
   4) What is quantitative data ?
   5) Define judgement sampling.
   6) What are the sources of information ?
   7) Define opinionnaire.
   8) Who is respondent ?

2. Answer in **8** to **10** sentences (**any two**) : **(8)**
   1) Explain the advantages of scientific research.
   2) Write the role of research in social sciences.
   3) Explain the characteristics of research.

3. Write short notes on (**any two**) : **(8)**
   1) Hypothesis
   2) Research design
   3) Structure of Research Report.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Explain the systematic steps and process of research.
   2) Write the significance of research and justify why research is being conducted.

[4017] – 372

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – V)
DS – 335 : Computer Application in Defence Management
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory.***
*2) Figures to the **right** indicate marks.*

1. Answer in **two** to **four** sentences : **16**
   1) State the meaning of Computer Aided Instruction.
   2) List the disadvantages of flowchart.
   3) Generation of Computers means what ?
   4) What is Hybrid Computers ?
   5) What is Languages ?
   6) What do you mean by Application of Computers ?
   7) What is Assembly Language ?
   8) Management of Defence means what ?

2. Answer in **eight** to **ten** sentences (**any two**) : **8**
   1) Explain the characteristics of Computer.
   2) What is Operational Research ? Explain.
   3) Why data representation and analysis is necessary in defence.

3. Write short notes on (**any two**) : **8**
   1) Components of a Computer Network
   2) C4
   3) CAM.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the importance of accurate information in security decision making.
   2) Discuss the evaluation of computer application in defence.

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[4017] – 375

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE & STRATEGIC STUDIES (Paper – VIII)
DS-338 (A) : Armed Conflict and Human Rights (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *question are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   a) What do you understand by Humanitarian Law ?
   b) What is meant by CEDAW ?
   c) Write the full form of ICRC.
   d) Who was Henry Dunant ?
   e) What do you mean by prisoners of war ?
   f) What is Human Rights ?
   g) What do you mean by combatant ?
   h) What do you understand by defenseless victims ?

2. Answer in **8** to **10** sentences (**any 2**) : **(8)**
   a) Write briefly on significance of Human Rights.
   b) Examine legal protection of children in armed conflict.
   c) Explain different types of armed conflicts.

3. Write short notes on (**any 2**) : **(8)**
   a) Describe the role of ICRC in armed conflicts.
   b) Comment on ICCPR.
   c) Examine Geneva convention on protection of innocent persons in times of war.

4. Answer in **16** to **20** sentence (**any one**) : **(8)**
   a) Discuss the role of humanitarian law in protection of civilians in time of war.
   b) Evaluate the emerging challenges to human rights protection.

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P.T.O.

[4017] – 375

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE & STRATEGIC STUDIES (Paper – VIII)
DS-338 (B) : International Organisations and National Security (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *question are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   a) What do you mean by International Organization ?
   b) When was League of Nations Established ?
   c) How many members are there in United Nations ?
   d) State the duration of World War I.
   e) What do you understand by Veto Power ?
   f) State the principal organs of League of Nations ?
   g) Write full form of UNGA and UNSC.
   h) When was UN established ?

2. Answer in **8** to **10** sentences (**any 2**) : **(8)**
   a) Comment on structure of League of Nations.
   b) Examine the causes of failure of League of Nations.
   c) Explain Pacific settlement in UN working.

3. Write short notes on (**any 2**) : **(8)**
   a) Write in brief on the evolution of United Nations.
   b) Analyze the working of League of Nations.
   c) Examine the principle Organ of UN.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   a) Discuss the functional agencies that would play in activities of UN.
   b) Analyze the role of the secretary general of the UN.

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[4017] – 375

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE & STRATEGIC STUDIES (Paper – VIII)
DS-338 (C) : International Law (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks: 40

N.B. *: 1)* ***All*** *question are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer in **two** to **four** sentences : **(16)**
   1) Define International Law.
   2) State the meaning of Human security.
   3) State the meaning of 'Laws of War'.
   4) What do understand by the term 'World Order' ?
   5) State the meaning of 'Diplomacy'.
   6) Define Codification.
   7) What are the essential elements of a State ?
   8) Write the meaning of 'Recognition'.

2. Answer in **8** to **10** sentences (**any two**) : **(8)**
   1) Explain scope of International Law.
   2) Discuss role of U.N. in Human Rights.
   3) Explain role of U.N. in World Peace.

3. Write short notes on (**any two**) : **(8)**
   1) International convention and treaties
   2) International Law related to war.
   3) Structure of U.N.O.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Explain functions of the U.N.O.
   2) Write a note on role of U.N.O. in disarmament.

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[4017] – 376

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 339 (A) : Defence Management in India (Optional)
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   1) Define 'Management'.
   2) What is 'Defence management' ?
   3) Define 'Team building'.
   4) Define 'Leadership'.
   5) Define 'War'.
   6) What is 'Battle Dynamism' ?
   7) Define 'Armed Forces'.
   8) Introduce 'Fayol'.

2. Answer in **8** to **10** sentences (**any two**) : **(8)**
   1) Write the principles of defence organisation.
   2) Write the applicability of management to defence.
   3) How soldiers are motivated ?

3. Write short notes on (**any two**) : **(8)**
   1) Nature of management.
   2) Functions of management.
   3) Scope of management.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Discuss the similarity of Industrial and military concept of management.
   2) Explain any five principles of Fayol's management.

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P.T.O.

[4017] – 376

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 339 (B) : Internal Security of India – I (Optional)
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*

1. Answer in **2** or **4** sentences **each** : **(16)**
   1) What do you mean by N.S.C.N. ?
   2) How you would like to define internal security ?
   3) Who is mainly responsible for preservation of internal security ?
   4) What do you mean by state ?
   5) What do you mean by Azad Kashmir ?
   6) Which Indian states being affected by Maxalite movement ?
   7) What do you understand by S.E.Z. ?
   8) Define Territority.

2. Answer in **8** or **10** sentences (**any two**) : **(8)**
   1) "Kashmir issue as a internal security problem" - Discuss.
   2) Explain in brief external linkages of India's internal security problems.
   3) Write in short eco-political dimensions of Maxalite problem.

3. Write short notes on (**any two**) : **(8)**
   1) Movement of 'Telangana State".
   2) Political dimension of Bodo issue.
   3) Concept of internal security.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Describe the role of state in preserving Human Security.
   2) Explain in detail "Elements of the state".

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[4017] – 376

T.Y. B.Sc. (Semester – III) Examination, 2011
DEFENCE AND STRATEGIC STUDIES (Paper – IX)
DS – 339 (C) : India's Maritime Security – I (Optional)
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate marks.*

1. Answer in **2** to **4** sentences **each** : **(16)**
   1) Define maritime security.
   2) State the meaning of maritime state.
   3) Define Exclusive Economic Zone (EEZ).
   4) State the meaning of sea-power.
   5) What do you mean by fixed assets of Naval power ?
   6) Define 'military strategy'.
   7) Write any two duties of Coast Gaurd.
   8) State the meaning of Navigational Aids.

2. Answer in **8** to **10** sentences (**any two**) : **(8)**
   1) Explain maritime Environment in India.
   2) Discuss concept of Territorial sea.
   3) Explain role of coast gaurd in national security.

3. Write short notes on (**any two**) : **(8)**
   1) Maritime boundaries.
   2) Maritime elements.
   3) Naval power in the management of national economy.

4. Answer in **16** to **20** sentences (**any one**) : **(8)**
   1) Discuss maritime resources and their importance to National Economy.
   2) Evaluate new challenges to India's maritime security.

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[4017] – 380

T.Y. B.Sc. (Semester – III) Examination, 2011
ENVIRONMENTAL SCIENCES
(2008 Pattern) (New) (Paper –IV)
ENV 304 : (Current Issues in Environmental Sciences)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory.***
*2) **Neat** and labeled diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Attempt the following in **1-2** lines **each**. **10**

a) What are bio-resources ?

b) Define GMO.

c) Mention any two objectives of green revolution.

d) Name any two biodiversity hotspots.

e) What do you mean by restoration ?

f) Enlist any two impacts of global warming on biodiversity.

g) Write the fullform of WTO.

h) What are different ways to access environmental information ?

i) Mention the role of NGO's in environmental management.

j) What is rehabilitation of degraded lands ?

P.T.O.

2. Write a short note on **(any two)** : **10**

   a) Life Cycle Assessment

   b) Gender and environmental issues

   c) Chernobyl disaster.

3. Answer **any two** from the following : **10**

   a) Discuss the outcome of copenhagen meet.

   b) Explain the concept of pastoralism.

   c) Why the participation and representation of citizens is necessary ?

4. Attempt **any one** of the following : **10**

   a) What is biodiversity conservation ? Discuss its significance. Explain various methods with suitable examples.

   b) 'Carbon plays significant role in future environmental policies'-Justify the sentence with appropriate examples.

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[4017] – 383

T.Y. B.Sc. (Semester – III) Examination, 2011
INDUSTRIAL CHEMISTRY (Paper – V)
Industrial Methods of Chemical Analysis
(Vocational Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory.***
*2) Figures to the **right** indicate **full** marks.*
*3) **Neat** diagrams must be drawn **wherever** necessary.*
*4) Use of calculator/Logarithmic table is **allowed**.*
*5) Assume suitable additional data if **necessary**.*

1. Answer precisely the following : **10**

   a) Write the reaction occurring in polarography.

   b) State the principle of 'Normal pulse polarography'.

   c) What is the role of gelatin in polarographic analysis ?

   d) Give two applications of X-ray absorption technique.

   e) State the characteristics of metal elements which are used as targets in an X-ray tube.

   f) What is the temperature of butane-air flame ?

   g) State the Boltzmann distribution law for excitation in FES.

   h) Name two detectors in mass spectrometry.

   i) Write the principle of ion-selective electrodes.

   j) Why is the pressure in a hollow cathode lamp maintained very low ?

2. A) Answer **any two** of the following. **6**

   a) Explain the applications of ion selective electrodes.

   b) Explain 'Oxygen interference' in polarography.

   c) Give the applications of X-ray diffraction technique.

P.T.O.

B) Answer briefly **any two** of the following : **4**

a) Write the expression for resolution in mass spectrometry peaks.

b) Explain the 'voltage ramp' used in square wave polarography.

c) Calculate the number of dynodes in a PM tube in AAS having amplification factor 256 and each dynode emitting 4 electrons.

3. Answer **any two** of the following : **10**

a) Enlist the factors determining the intensity of atomic spectral lines.

b) Explain the working of a time-of-flight mass analyses.

c) The diffusion coefficient of oxygen at 25°C in aqueous solution is $2.65\times10^{-5}cm^2/s$.

A dme with $m^{2/3}t^{1/6}$ of 1.86 $mg^{2/3}s^{-1/2}$ was used to assay a natural water sample. The diffusion current of the first oxygen wave was $2.3\mu A$. Calculate the concentration of dissolved oxygen in the water.

4. A) Draw a neat labelled diagram of a polarograph and explain its working. **6**

OR

A) Calculate the magnetic flux density required to focus an ion with $\frac{m}{z}140$ on the exit slit of a magnetic analyzer in which the accelerating potential is 6500 V and the radius of curvature of the ionic beam at the exit slit is 20.0 cm.

B) Answer **any one** of the following : **4**

a) Give the principle and application of neutron diffraction analysis.

b) Describe the construction and working of an X-ray tube.

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[4017] – 384

T.Y. B.Sc. (Semester – III) Examination, 2011
BIOTECHNOLOGY (Vocational)
Biotech – 335 : Plant Biotechnology (Paper – V) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Black figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*

1. Answer **each** of the following : **10**

a) Give two advantages of secondary metabolites production.

b) Give two disadvantages of somaclonal variation.

c) Give two important applications of plant tissue culture.

d) Name the components of encapsulation matrix of artificial seeds.

e) What are transgenic plants ?

f) What is meant by germplasm ?

g) Define micropropagation.

h) What is anther culture ?

i) What is electroporation ?

j) Define callus.

2. Answer **any two** of the following : **10**

a) Discuss the causes of somaclonal variation.

b) Describe the production of secondary metabolites.

c) Describe the micropropagation of endangered species.

P.T.O.

3. Write short notes on **any two** of the following : **10**

   a) Types of somatic embryogenesis.

   b) GM food.

   c) Steps involved in cryopreservation.

4. What is ovule culture ? Describe the uses of haploids in plant breeding. **10**

   OR

   Describe in detail the method of gene transfer in plants using Agrobacterium tumefaciens.

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[4017] – 385

T.Y. B.Sc. (Semester – III) Examination, 2011
PHOTOGRAPHY AND AUDIO -VISUAL PRODUCTION (Paper – V)
(Vocational) (2008 Pattern)
Video Recording and Playback Systems

Time : 2 Hours | Max. Marks : 40

Instructions : *1) **All** questions are **compulsory.***
*2) Draw neat and labeled diagrams **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Answer the following in short. **10**

   a) Resolution of a TV picture does not depend on the size of TV screen. Comment.

   b) State the primary colors used in color TV.

   c) State the purpose of dichroic mirrors in a color TV camera.

   d) How is an ACD replayed ?

   e) State the horizontal and vertical scanning frequencies.

   f) What are the applications of an O.B. Van ?

   g) Define aspect ratio.

   h) Define the terms 'color hue' and 'saturation'.

   i) Why is helical scan system used in a VCR ?

   j) What is the special application of magnetic video disc machine ?

2. Attempt **any two** of the following : **10**

   a) Describe the facilities in an O.B. Van.

   b) What is scanning ? Explain one complete frame of odd line interlaced scanning pattern.

   c) Comment on advantages and disadvantages of film and video tape as video recording medium.

P.T.O.

3. Attempt **any two** of the following. **10**

   a) Explain the term 'helical scan' and the need for rotating head mechanism. What is track survey ?

   b) Giving a neat diagram explain the working of color picture tube.

   c) Explain the working of magnetic video disc machine.

4. Attempt **any one** of the following : **10**

   a) Draw a neat labeled diagram of composite video signal. What is color burst ?

   b) Draw a neat labeled block diagram of B/W TV receiver. Show wave forms at different points.

   c) Explain record electronics in VCR. Draw a block diagram of ACD player and explain its working.

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[4017] – 387

T.Y. B.Sc. (Semester – III) Examination, 2011
INDUSTRIAL MICROBIOLOGY (Paper – V) (Vocational)
VOC-IND-MIC-335 : Pollution Control Technology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **Neat** diagrams must be drawn **wherever** necessary.*
*2) Black figures to the **right** indicate **full** marks.*
*3) **All** questions carry **equal** marks.*
*4) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) Assume suitable data, **if necessary**.*
*6) **All** questions are **compulsory**.*

1. Answer as directed. **10**

For **(a)** to **(d)** state whether the statement given is **True** or **False** :

a) Color can be indicative of activated sludge health.

b) Settled bacteria in an aeration basin provide much of the treatment there.

c) A low solid content in the aerator is indicated by white, fluffy foam and a high solid content is indicated by brown, leathery foam.

d) When sludge does not settle properly it is called “sludge bulking”.

For **(e)** to **(j)** choose the best option/answer among those given :

e) Volatile Solids (VSS) are those that
   a) Are determined by burning the residue from the Total Solids determination
   b) Are dangerous to the operator because of the flash point
   c) Are hazardous to Aquatic Life
   d) Small particles that do not settle
   e) Bind with grease to cause blockage in the collection system

f) Grit chambers would be considered
   a) A part of the Collection System
   b) A part of Primary Treatment
   c) A part of Secondary Treatment
   d) Overrated and not cost effective to perform
   e) Only in domestic sewage treatment

g) Which of the following trickling filter problems could be reduced by increasing the recirculation ratio ?
   a) Filter Flies b) Filter Ponding c) pH Stabilization d) Both a and b

h) Which of these indicates poor clarifier performance ?
   a) Floating clumbs of sludge on water surface
   b) Low pH of wastewater and odour
   c) Loss of slids over effluent weirs
   d) All of the above

i) What does Activated sludge process mean ?

   You answered :
   a) The sludge particles are teeming with bacteria, fungi and protozoa
   b) Activated air is used in the process
   c) The plant must be activated before the wastewater is treated
   d) The microorganisms must be activated before they start treating the wastewater

j) To prevent excessive solids buildup in the activated sludge process, what must be done to some of the solids in the process ?
   a) They must be chlorinated
   b) They must be returned to the headworks
   c) They must be wasted
   d) They must be discharged with effluent

   In an activated sludge system, what, among those mentioned below, is the most important parameter affecting biological activity ?
   a) pH b) Alkalinity c) Dissolved oxygen d) Temperature

2. Answer **any two** of the following : **10**

   a) State the principle on which Type II sedimentation is based, and explain the phenomenon, mentioning its application.

   b) Draw a labeled diagram of a UASB reactor, and explain its functioning.

   c) What is flow equalization ? Explain its role in wastewater treatment process.

3. Answer **any two** of the following : **10**

   a) Describe the need and any one biological process of phosphorus removal from wastewaters.

   b) Describe the process of granular medium filtration. Use a diagram to explain the process.

   c) Explain how Rotating Biological Contactors may be considered as a combined unit process for secondary treatment of wastewaters.

4. Answer **any one** of the following : **10**

   a) Given the following information, calculate the MCRT.

Influent TSS	315 mg/L
Waste activated sludge total suspended solids	6300 mg/L
Mixed liquor suspended solids	3300 mg/L
Effluent total suspended solids	15 mg/L
Influent flow	7.5 mgd
Waste activated sludge flow	0.06 mgd
Primary clarifier volume	0.4 million gal
Aeration basin volume	1.2 million gal
Secondary clarifier volume	0.33 million gal

   b) Draw a flow sheet of a typical two-stage trickling filter system. Explain the critical operating parameters for efficient functioning of the process.

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[4017] – 388

T.Y. B.Sc. (Semester – III) (New) Examination, 2011
Computer Hardware & Network Administration
Paper – V : COMPUTER / IT SERVICE MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT (Vocational)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

1. Attempt **all** in **one** or **two** sentences : **(1×10=10)**

   1) What is COBIT ?

   2) What do you understand by term 'SOD' ?

   3) CEO stands for.

   4) What is Escalation ?

   5) What is a change ?

   6) Can we use a single user license on multiple PC's.

   7) Name any two ISO standards defined for Information security.

   8) Can system administrator also be a End user.

   9) What does 'CIA' stand for in information security ?

   10) What is a SLA ?

2. Attempt **any two** of the following : **(5×2=10)**

   1) How do we prepare a RFP ?

   2) Give any Five Access Controls with example of each.

   3) Explain software licensing in brief.

P.T.O.

3. Attempt **any two** of the following : **(5×2=10)**

   1) Why do we prepare a ITT ?

   2) State the various functions of IS Audit.

   3) Write a note on “Change Management Process”.

4. Attempt **any one** of the following : **(10×1=10)**

   1) What is an incident ? Explain it with any four examples.

   OR

   2) a) Why segragation of duties is necessary ?

      b) Why a proper help desk is necessary ?

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[4017] – 391

T.Y. B.Sc. (Semester – III) Examination, 2011
BIOTECHNOLOGY (Paper – VI) (Vocational)
Environmental Biotechnology (Biotech – 336)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw diagrams **wherever** necessary.*

1. Answer **each** of the following : **10**

a) What is environmental biotechnology ?

b) Enlist the bioreactors used for waste water treatment.

c) What are methanogens ?

d) What are biofuels ?

e) Define pollutants.

f) Name any two bacteria employed for degradation of pesticides.

g) What are biopesticides ?

h) What is composting ?

i) What is recalcitrance ?

j) Define in-situ bioremediation.

2. Answer **any two** of the following : **10**

a) What are biofertilizers ? Explain any one biofertilizer.

b) What is biosorption ? Give its applications.

c) Explain the role of microorganisms in waste water treatment.

P.T.O.

3. Write short notes on **any two** of the following : **10**

   a) Ethanol production.

   b) Biogas production.

   c) Applications of biotechnology to food industry.

4. What is bioremediation ? Explain its applications by citing various case histories. **10**

   OR

   Explain the role of biotechnology in hazardous waste management.

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[4017] – 392

T.Y.B.Sc. (Semester – III) Examination, 2011
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
(Paper – VI) Video Production (Vocational)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions *: 1) Attempt* ***all*** *questions.*
2) Draw ***neat*** *and labelled diagrams* ***wherever*** *necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Answer the following : **10**
   a) Explain the concept of reality show.
   b) Name any four non-fiction programs on television.
   c) Explain the concept of SHOT.
   d) Explain the difference between a documentary and a short film.
   e) Explain the role of production manager in making any television production.

2. Answer **any two** of the following : **10**
   a) Explain different types of shot.
   b) Explain the pre-production process.
   c) Explain the difference between docudrama and documentary.

3. Write a script for 30 sec social advertisement on the following theme in drama format. **10**

   "Appeal to youth in participation of anti corruption movement'.

   OR

3. Write a script for 30 sec social advertisement on the following theme in documentary format. **10**

   "Appeal to youth in participation of anti corruption movement'.

4. Write short notes on **any two** : **10**
   a) Importance of continuity in shooting.
   b) Importance of sound in television production.
   c) Importance of research in documentary production.

[4017] – 396

T.Y. B.Sc. (Semester – III) (Vocational) Examination, 2011
SEED TECHNOLOGY (Paper – VI)
Seed Farm Management, Processing and Storage
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **All** questions carry **equal** marks.*

1. Attempt the following : **(10×1=10)**

a) What is the use of farm management in actual farming ?

b) Mention any two factors involved in the farm business selection.

c) Draw layout of seed processing plant.

d) What is seed drying ?

e) Enlist the types of seed treatment.

f) Mention any one method of seed storage.

g) What is seed marketing ?

h) Write one objective of processing.

i) Enlist any two steps involved in seed processing.

j) What is physical seed treatment ?

2. Answer **any two** of the following : **(2×5=10)**

a) Explain in detail process of separation and grading.

b) Write an account on farm management and agricultural economics.

c) Explain in detail changes during seed storage.

P.T.O.

3. Write notes on **any two** of the following : **(2×5=10)**

   a) Major components of seed marketing.

   b) Mechanical seed treatment.

   c) General farming for beginners.

4. What is seed processing ? Give an account of various steps involved in seed processing. **10**

OR

4. a) Explain in detail methods of seed storage. **(2×5=10)**

   b) Comment on seed conditioning.

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