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T.Y. B.Sc. (Semester – IV) Examination, 2011
INDUSTRIAL CHEMISTRY (Vocational)
(Paper – V) Entrepreneurship Development
(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 precisely the following : **10**

a) Who is an entrepreneur ?

b) How does an entrepreneurs generate employment ?

c) What is innovation ?

d) What is risk bearing ?

e) Define the term Cost Accountancy.

f) Define the term Assessee u/s 3 of the Income Tax Act.

g) Define the term Break-Even point.

h) What is subsidy ?

i) What is seed capital ?

j) What is SICOM ?

2. A) Answer the following (**any two**) : **6**

a) What is the role of training in developing entrepreneurs ?

b) What are the conditions for successful market segmentation ?

c) What are the heads of income under Income Tax Act ?

P.T.O.

B) Answer briefly the following (**any two**) : **4**

a) What is stress management ?

b) List three types of pricing strategies.

c) What is taxation ?

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

a) What is the role of various funding agencies ?

b) Which are the different modes of employment ?

c) Explain the need and importance of entrepreneurship.

4. a) What is the difference between marketing and selling ? **6**

OR

a) Explain the various characteristics of company organization. **6**

b) Answer the following (**any one**) : **4**

i) Differentiate between training and development.

ii) List and explain any four types of entrepreneurs.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – III)
CH – 343 : Organic Chemistry (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) ***Draw*** *structures and neat diagrams if* ***necessary****.*
iv) IR, NMR and UV spectroscopic ***data*** *is given in Table –* ***1****,* ***2*** *and* ***3*** *respectively.*

1. Answer the following : **10**

i) What do you mean by reactive methylene group ?

ii) Phenol on nitration with dil.HNO_3 gives P-nitrophenol as a major product. Justify.

iii) Define and explain the term synthon.

iv) Explain $\pi \rightarrow \pi^*$ transition with suitable example.

v) Calculate the fundamental modes of vibrations of ammonia molecule.

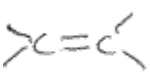
vi) Explain isoprene rule.

vii) What is Friedel-Crafts alkylation ?

viii) How many types of proton are present in the following compound ?

$CH_3 - CH_2 - O - CH_2 - O - CH_3$

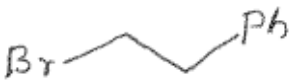
ix) Define the term Amplitude (a).

x) How will you prove the presence of two  in citral ?

P.T.O.

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

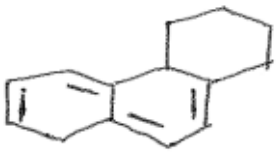
i) Write retrosynthesis and synthesis for

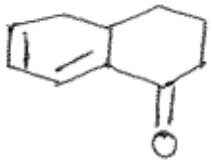


ii) What is nitration of benzene ? Suggest its mechanism.

iii) How will you prepare cyclopentyl methyl ketone from aceto acetic ester ?

B) Calculate UV λ_{max} for the following : **4**

i) 

ii) 

OR

B) i) Explain Wittig reaction with suitable example. **2**

ii) Write the disconnection approach and synthon of 2-cyclohexenone. **2**

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

a) i) Write the synthesis of Citral starting from methyl heptenone. **3**

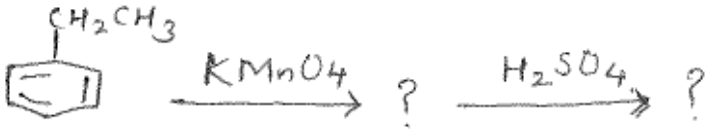
ii) How does hydrogen bonding affects I.R. frequencies in the organic molecules ? **2**

b) i) Explain the orientation effect of electron donating and withdrawing groups in aromatic electrophilic substitution reactions. **3**

ii) How will you prove the presence of benzene ring in Ephedrine ? **2**

c) i) Band due to c = o stretching in acetaldehyde appears at 1745 cm^{-1} while that in acetone it is at 1715cm^{-1}. Explain. **3**

ii) Predict the product with justification.



2

4. A) Propose structures for the compounds from the following spectroscopic data. Justify your answer. (**any two**). **6**

i) Molecular formula : C_7H_8

UV λ_{max} = 255 nm

IR = 1500 – 1600 cm^{-1}

NMR = a) Singlet at 2.32 δ (3H)

b) Singlet at 7.17 δ (5H)

ii) Molecular formula : $C_4H_8O_2$

UV λ_{max} = 280 nm

IR = 1740 cm^{-1}

NMR = a) 1.1 δ (t, J = 7 Hz, 24 mm)

b) 2.1 δ (s, 24 mm)

c) 3.4 δ (q, J = 7 Hz, 16 mm)

iii) Molecular formula : $C_5H_{10}O$

UV λ_{max} = 260 nm, 290 nm (weak)

IR = 1720 cm^{-1}

NMR = a) d, 1.1 δ (6 H)

b) m, 2.5 δ (1 H)

c) s, 2.1 δ (3 H)

4. B) i) How will you distinguish following pair by IR spectroscopy ?

Ph – CHO and Ph – CH_2 – OH **2**

ii) Give general properties of alkaloids. **2**

OR

i) Benzene undergoes electrophilic substitution reaction with Br_2/CCl_4 rather than addition reaction. **2**

ii) Predict the product with justification : **2**

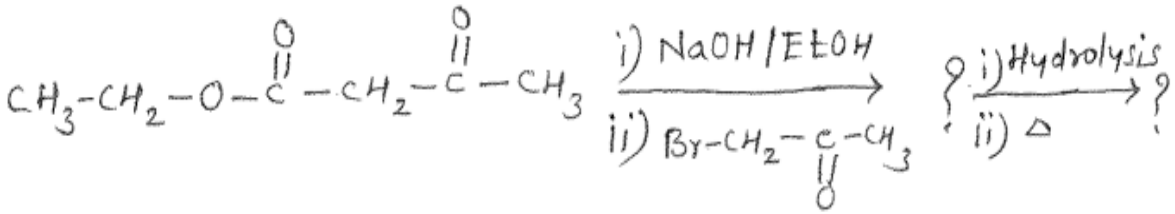


TABLE – 1
Characteristic Infrared Absorptions of Functional Groups

	GROUP		FREQUENCY RANGE cm^{-1}	INTENSITY
A.	Alkyl			
	C–H (stretching)		2853–2962	(m – s)
	Isopropyl – $CH(CH_3)_2$		1380 – 1385	(s)
		and	1365 – 1370	(s)
	tert – Butyl – $C(CH_3)_3$		1385 – 1395	(m)
		and	1365	(s)
B.	Alkenyl			
	C–H (stretching)		3010 – 3095	(m)
	C = C (stretching)		1620 – 1680	(v)
	R– CH = CH_2		985 – 1000	(s)
		and	905 – 920	(s)
	R_2 C = CH_2	(out of plane	880 – 900	(s)
	cis – RCH = CHR	C–H bendings)	675 – 730	(s)
	trans – RCH = CHR		960 – 975	(s)
C.	Alkynyl			
	≡ C–H (stretching)		3300	(s)
	C ≡ C (stretching)		2100 – 2260	(v)
D.	Aromatic			
	Ar – H (stretching)		3030	(v)
	Aromatic substitution type			
	(C–H out-of-plane bendings)			
	Monosubstituted		690 – 710	(very s)
		and	730 – 770	(very s)
	o – Disubstituted		735 – 770	(s)
	m – Disubstituted		680 – 725	(s)
		and	750 – 810	(very s)
	p – Disubstituted		800 – 840	(very s)
E.	Alcohols, Phenols, Carboxylic Acids			
	OH (alcohols, phenols, dilute solutions)		3200 – 3550	(broad)
	OH (alcohols, phenols, hydrogen bonded)		2500 – 3000	(very broad)
	OH (carboxylic acids, hydrogen bonded)			
F.	Aldehydes, Ketones, Esters and Carboxylic Acids			
	C = O stretch		1630 – 1780	(s)
	aldehydes		1690 – 1740	(s)
	ketones		1680 – 1750	(s)
	esters		1735 – 1750	(s)
	carboxylic acids		1710 – 1780	(s)
	amides		1630 – 1690	(s)
G	Amines			
	N – H		3300 – 3500	(m)
H.	Nitriles			
	C ≡N		2220 – 2260	(m)
I.	–C–O stretch (alcohol, ether, phenol		1000 – 1300	(s)
J.	Nitro N = O		1550 – 1350	(s)
k.	Halides	F	1400 – 1000	(s)
		Cl	785 – 540	(s)
		Br	< 667	(s)

TABLE – 2

Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)		
1° Alkyl, RCH_3	0.8 – 1.0		
2° Alkyl, RCH_2R	1.2 – 1.4		
3° Alkyl R_3CH	1.4 – 1.7	Ester $R-\overset{\overset{O}{\|}}{C}-O-CH_2-R$	4 to 4.5
Allylic, $R_2C=\overset{\overset{R}{\|}}{C}-CH_3$	1.6 – 1.9		
Benzylic, $ArCH_3$	2.2 – 2.5		
Alkyl chloride RCH_2Cl	3.6 – 3.8		
Alkyl bromide, RCH_2Br	3.4 – 3.6		
Alkyl iodide, RCH_2I	3.1 – 3.3		
Ether, $ROCH_2R$	3.3 – 3.9		
Alcohol, $HOCH_2R$	3.3 – 4.0		
Ketone, $RC(=O)CH_3$	2.1 – 2.6	$R-\overset{\overset{O}{\|}}{C}-CH_2-$	2.4 δ
		$R-\overset{\overset{O}{\|}}{C}-\overset{\|}{C}H-$	2.5 δ
Aldehyde, $RC(=O)H$	9.5 – 9.6		
Vinylic, $R_2C=CH_2$	4.6 – 5.0		
Vinylic $R_2C=\overset{\overset{R}{\|}}{C}H$	5.2 – 5.7		
Aromatic, ArH	6.0 – 9.5		
Acetylenic, $RC\equiv CH$	2.5 – 3.1		
Alcohol hydroxyl, ROH	0.5 – 6.0[a]		
Carboxylic, $RC(=O)OH$	10 – 13[a]		
Phenolic, ArOH	4.5 – 7.7[a]		
Amino $R-NH_2$	1.0 – 5.0		

[a]The chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE – 3

U.V. Absorption rules for diene chromosphores

1) Parent	215 nm	6) – halogen	5 nm
2) Each extra conjugation	30 nm	7) – SR	30 nm
3) Homoannular	39 nm	8) – NR_2	60 nm
4) Exocylic double bond	05 nm	9) – OH,– OR	5 nm
5) Each alkyl (R) substituent directly attached to double bonded carbon	05 nm		

U.V. Absorption rules for Enone System

1) Parent	215 nm (207 nm for aldehyde) (202nm for five member ring)		
2) Each extra conjugation	30 nm	6) – Cl	α 15 nm
3) Homoannular	39 nm	7) – OH, –OR	β 12 nm
4) Substituents		8) – SR	α 35 nm
a) Alkyl group at α	10 nm	9) – NR2	β 30 nm
b) Alkyl group at β	12 nm		β 85 nm
c) Alkyl group at γ, δ & higher	18 nm		β 95 nm
5) Exocylic double bond	05 nm		

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MICROBIOLOGY (Paper – II)
MB 342 : Genetics and Molecular Biology – II
(2008 Pattern) (New)

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. Attempt the following : **10**

A) Select and write the correct option :

1) The meaning of the letter R in ECO RI is _____

a) Restriction b) Recombinant
c) RY strain d) Recognition site

2) If the recombination frequency between genes a & b is 18%, b & c is 12% and a & c is 7%, what is the order of genes on the chromosome ?

a) a – b – c b) a – c – b
c) c – a – b d) b – a – c

3) The role of rec A protein in recombination is _____

a) to hold two DNA together b) to cut DNA
c) to ligate DNA d) to separate the recombinant DNA

B) State **True** or **False** :

1) The frequency of recombination decreases as the distance between the selected genes increases.

2) Plasmids are essential for survival of bacteria.

P.T.O.

C) Match the following :

(A)	(B)
a) Target site for RE	i) ATP
b) Tryptophan synthetase	ii) Palindromic sequence
c) Acridine orange	iii) Discovery of transduction
d) Davi's U tube	iv) Curing of plasmid
e) T_4 DNA ligase	v) Inter-cistronic complementation

2. Draw only diagrams of **any two** of the following : **10**

   a) Breakage and copying model of recombination.

   b) Rolling circle mechanism of plasmid replication.

   c) Flow chart of homopolymer tailing technique.

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

   a) Explain the principle of four on four test used in mapping DNA.

   b) Explain the generalized transduction mediated by P_{22}.

   c) Explain the process of transformation in H. influenzae.

4. Diagrammatically illustrate the conjugal transfer of F plasmid from F^+ to F^- strains of E.Coli. **10**

   OR

   Explain agarose gel electrophoresis of DNA w.r.t.

   a) principle

   b) requirement

   c) protocol and

   d) detection.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
SEED TECHNOLOGY
Paper – V : Entrepreneurship Development
(2004 Pattern) (Vocational)

Time : 2 Hours Max. Marks : 40

Instructions *: **All** questions are **compulsory**.*
*Figures to the **right** indicate **full** marks.*
*Sketch **neat** labeled figures **wherever** necessary.*

1. Answer the following : **(1×10=10)**

   a) What is the need of entrepreneurship ?

   b) Give any one demerit in co-operative organisation.

   c) Write full form of DIC.

   d) Name any one funding agency.

   e) What is meant by marketing mix effect ?

   f) What is the meaning of breakdown point ?

   g) Give the name of any one co-operative bank.

   h) What is the role of consultancy organization ?

   i) Write the act of wages payment.

   j) Mention one merit in partnership business.

2. Attempt **any two** of the following : **(2×5=10)**

   a) Give an account of any form of business organization.

   b) Write the functions of Pollution Control Board.

   c) Explain how basic financial statements can be prepared.

P.T.O.

3. Write short notes on **any two** of the following : **(2×5=10)**

   a) Registration for small scale industries

   b) Training of personnel

   c) Scope of entrepreneurship.

4. Write an account on various barriers involved in entrepreneurship and means to reduce them. **10**

   OR

   Give an account of Maharashtra State Finance Corporation (MSFC) and Industrial Development Bank of India (IDBI).

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T.Y. B.Sc. (Vocational) (Semester – IV) Examination, 2011
SEED TECHNOLOGY (Paper – VI)
Biotechnology and Intellectual Property Rights
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **one** sentence **each** : **(1×10=10)**

   a) Write any two applications of Biotechnology.

   b) Give any two applications of PCR.

   c) What is the use of DNA finger printing ?

   d) Define micro propagation.

   e) Give any two techniques used for Variety Identification.

   f) Define Hardening of plants.

   g) Write any two branches of biotechnology.

   h) What is meant by synthetic seeds ?

   i) Define restriction enzymes.

   j) What is Patent ?

2. Answer the following (**any two**) : **(5×2=10)**

   a) Explain in detail – PCR.

   b) Explain in brief – Anther culture.

   c) Comment on World Trade Organization.

P.T.O.

3. Write notes on **any two** of the following : **(5×2=10)**

   a) Bt-Cotton

   b) Seed Storage Proteins

   c) Embryo culture.

4. Explain any two techniques employed in varietal identification in detail. **10**

   OR

   Explain in detail various steps involved in the micro propagation of Banana.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – I)
MT-341 : Metric Spaces (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) Show that any open interval (a, b) in R' is an open ball.

ii) Find the set of all cluster points of Z in R' and the set of all limit points of Z in R^1.

iii) Give an example of a proper open dense subset of R^2.

iv) Let (X, d) be an infinite discrete metric space. Give an open cover of X which doesn't admit a finite subcover.

v) Show that any finite subset of a metric space is compact.

vi) Show that $X = \{(x, y) \in R^2 / x^2 + y^2 < 1\}$ is not a complete metric space with respect to the usual metric.

vii) If in a metric space B (x, r) = B (y, s) then is it true that x = y and r = s ? Justify.

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

i) Let (X, d) be a metric space. Then for $x \in X$ and r > 0 show that the open ball B (x, r) is an open subset of X.

ii) If $F_1, F_2, F_3 \ldots F_n$ are closed subsets of a metric space (X, d), then show that $\bigcap_{i=1}^{n} F_i$ is a closed subset of X.

iii) In a metric space (X, d) prove that a Cauchy sequence is convergent if and only if it has a convergent subsequence.

P.T.O.

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

i) Prove that any continuous function f from a compact metric space (X, d) to another metric space (Y, ρ) is bounded.

ii) Show that any two closed and bounded intervals in R' are homeomorphic.

iii) Let (X, d) and (Y, ρ) be metric spaces. Let $f : X \to Y$ be a function. Prove that f is continuous at $a \in X$ if for given $\varepsilon > 0, \exists \delta > 0$ such that if $d(x, a) < \delta$ then $\rho[f(x), f(a)] < \varepsilon$.

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

i) a) Let X be a connected metric space and $g : X \to Y$ be a continuous function then show that $g(X)$ is a connected subset of Y.

b) Show that any closed subset of a complete metric space is complete.

ii) a) If A is a connected subset of a metric space X and if $A \subset B \subset \overline{A}$ then prove that B is connected.

b) Let $G = \left\{ \left(\frac{1}{n}, 1 \right) \middle/ n \in N, n \geq 2 \right\}$. Is G an open covering of (0, 1) ? Justify.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – VII)
MT-347 (A) : Optimization Techniques
(Elective) (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) What are the different criterion for making a decision under uncertainty ?

ii) What is a game ? Define two person zero sum game.

iii) Define extreme point real valued function of several variables $f(x)$. State the necessary condition for X_0 to be an extreme point of $f(x)$.

iv) What are CPM and PERT ?

v) Write the conditions satisfied by critical activity (i, j).

vi) Write different situations of replacement policies.

vii) What is no passing rule in a sequencing algorithm ?

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

i) Find the sequence that minimises the total elapsed time required to complete the following tasks on two machines. Also, determine total elapsed time and idle time on each machine.

Job	A	B	C	D	E	F	G	H	I
Machine I	2	5	4	9	6	8	7	5	4
Machine II	6	8	7	4	3	9	3	8	11

P.T.O.

ii) The data on the running costs per year and resale price of equipment A whose purchase price is Rs. 2,00,000 are given below :

Year	1	2	3	4	5	6
Running Cost (Rs.)	30,000	38,000	46,000	58,000	72,000	90,000
Resale value (Rs.)	1,00,000	50,000	25,000	12,000	8,000	8,000

What is the optimum period of replacement ?

iii) Determine the maximum or minimum point (if any) of the function $f(x, y) = x + 2y + xy – x^2 – y^2$.

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

i) Players A and B play a game in which each has three coins, a 5p, 10p and a 20p. Each selects a coin without the knowledge of other's choice. If the sum of the coins is an odd amount, then A wins B's coin. But, if the sum is even, then B wins A's coin. Find the best strategy for each player and the value of the game.

ii) Solve the following game graphically :

		I	**II**	**III**	**IV**
A	1	2	2	3	–2
	2	4	3	2	6

iii) Solve the following game :

		B			
		B_1	B_2	B_3	B_4
A	A_1	3	2	4	0
	A_2	3	4	2	4
	A_3	4	2	4	0
	A_4	0	4	0	8

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

i) The following table lists the jobs of a project with their time estimates.

Job (i - j)	Time Estimates (in weeks)		
	Optimistic	**Most likely**	**Pessimistic**
1 – 2	3	6	15
1 – 6	2	5	14
2 – 3	6	12	30
2 – 4	2	5	8
3 – 5	5	11	17
4 – 5	3	5	15
6 – 7	3	9	27
5 – 8	1	4	7
7 – 8	4	19	28

a) Draw the project network

b) Calculate the length and variance of the critical path.

ii) Information on the activities required for a project are as follows :

Name	**:**	A	B	C	D	E	F	G	H	I	J	K
Activity Node	**:**	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
Duration (days)	:	2	7	8	3	6	10	4	6	2	5	6

Draw the network and calculate the earliest and latest start and finish times of each of the activities. Also determine the critical path.

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T.Y.B.Sc. (Semester – IV) Examination, 2011
MT-347 (C) : MATHEMATICS (Paper – VII)
(2008 Pattern) (New Course)
(Elective) "C"-Programming – II

Time : 2 Hours Max. Marks : 40

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

   i) Explain the use of operator '&'.

   ii) Declare 'a' as a pointer to array of 100 integers.

   iii) Write a macro 'sqr(a)' to find square of a .

   iv) State the meaning of the following declaration

   int * f(int * a. int b);

   v) Explain the use of pre-processor : include.

   vi) Explain the use of member selection operator '$\rightarrow$'.

   vii) Explain in short, the use of storage class static.

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

   i) Explain the use of function : malloc.

   ii) Explain the use of function : fopen.

   iii) Define struct point having two members of type float. Write a program to accept two points from user and print distance between them.

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

   i) Explain the use of storage classes : 'auto' and 'extern'.

   ii) Write a program to find number of characters in a text file.

   iii) Write a note on pointer arithmetic in C.

P.T.O.

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

i) a) Trace the output, if program is correct.

```
# include <stdio.h>
int main() {
        char *t = “computer”;
        while (*t)
                printf (“%s\n”, t++);
           }
```

b) Write a note on shift operators.

ii) a) Explain the use of function ‘realloc’.

b) Write a note on functions : ‘fgetc’ and ‘fputc’.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – V)
PH-345 (A) : Electronics (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) ***Use*** *of log table and calculator are* ***allowed****.*

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

a) Give two examples of optoelectronic devices.

b) State the advantages of LEDs over incandescent lamps.

c) Which feed back is used in amplifier circuit ?

d) What is high-fidelity amplifier ?

e) State the formula for voltage gain of an amplifier.

f) Draw the schematic symbol for n-channel JFET.

g) Define common-mode rejection ratio.

h) State the typical values of input impedance, an output impedance and a voltage gain of 741C.

i) State two ways to improve voltage regulation.

j) Draw the symbol for R-S flip-flop.

2. Attempt **any two** :

a) Draw the block diagram of 555 timer. Explain various comprising parts. **5**

b) What is regulator ? Draw the circuit diagram for + 15 voltage regulator using three terminal. **5**

c) Why regulated supplies usually include current limiting ? **5**

P.T.O.

3. Attempt **any two** :

a) Explain application of FET-as variable resistor. **5**

b) Draw the diagram for application of Op-Amp as integrator. Derive the necessary formula. **5**

c) What are the characteristics of power supply ? If the no-load voltage is 10 V and the full load voltage is 9.9 V, calculate the percent regulation. **5**

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

a) What is the difference between combinational and sequential logic ? What are multiplexers and demultiplexers ? Draw the diagram for 8-input multiplexer. **8**

b) What is a register ? State four possible modes of operation. Draw the block diagram of IC-7490 and its use as decade counter. **8**

B) Attempt **any one** :

a) Draw the figure for R-S flip-flop as J-K flip-flop. **2**

b) Give the classification of counters. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – V)
PH-345 (B) : Advanced Electronics (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) ***Draw*** *neat diagrams* ***wherever*** *necessary.*
4) ***Use*** *of log tables and calculators is* ***allowed****.*

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

a) What do you mean by a process control ?

b) What is photovoltaic effect ?

c) State peltier effect in thermocouple.

d) Define dissipation constant of RTD.

e) State any two advantages of bimetallic thermometer.

f) Draw a circuit symbol for solenoid valve.

g) State the objectives of control system.

h) State any two advantage of Wheatstone bridge circuit in signal conditioning system.

i) What is PLC ?

j) Draw a Thevenin equivalent circuit for a photovoltaic cell.

2. Attempt **any two** :

a) What is pyrometry ? Write a short note on broad band pyrometers. **5**

b) Draw a physical ladder diagram for a motor with NO start button, NC stop button thermal overload limit switch to opens ON at high temperature, green light when running and red light for thermal over load. **5**

c) A measurement signal frequency is less than 1 KHz but there is an unwanted noise at about 1 MHz. Design a RC low pass filter that attenuates noise to 1%. Given C = 0.01 μf. **5**

3. Attempt **any two** :

a) Explain in short the linearization technique used for non linear output of a sensor in signal conditioning. **5**

b) State different types of accelerometers and explain any one in detail. **5**

c) Write a short note on common software functions provided by a modern PLC's. **5**

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

a) Draw a neat diagram for data acquisition system and explain it in brief. **8**

b) Draw a neat diagram of ON/OFF control system for cooling/heating a medium (home air conditioning system) and explain its operation in detail. **8**

B) Attempt **any one** :

a) What is the difference between NTC and PTC type thermistors. **2**

b) A gas in a closed volume has a pressure of 120 psi at a temperature of 20°C. What will the pressure be at 100°C ? **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – IV)
CH-344 : Analytical 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) ***Use*** *of log tables and calculators is* ***allowed****.*
4) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*

1. Answer the following : **10**

1) Define the term diffusion current.
2) Give any two advantages of glass electrode.
3) Define the term chromatography.
4) What is chromatogram ?
5) Why CO_2 used as mobile phase for SFC ?
6) What analytical information is obtained from molecular ion peak in mass spectrum ?
7) What is migration velocity in electrophoresis ?
8) What is residual current in polarography ?
9) Give two advantages of HPLC.
10) State nitrogen rule in mass spectrometry.

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

1) Describe construction and working of calomel electrode.
2) Explain moving boundary electrophoresis.
3) Give brief account of number of theoretical plate in GC.

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

1) What are merits of DME ?
2) Find the H^+ ion concentration of a solution whose pH is 3.42.
3) Calculate the number of sites of unsaturation in a compound C_6H_6NCl.

P.T.O.

3. Attempt **any two** of the following : **10**
   1) Explain the principle and technique of paper chromatography. List applications of it.
   2) Sketch the schematic diagram of the appartus used for GLC. Describe its components in brief.
   3) Give block diagram of HPLC instrument. Explain various components of it.

4. A) What is principle of mass spectrometry ? Discuss its qualitative and quantitative applications. **6**

OR

A) 1) Sketch ideal polarographic wave. Explain the term migration current and limiting current. **3**

2) What are the different methods employed in column packing in HPLC technique ? **3**

B) For the particular DME, the capillary constant $m^{2/3}.t^{1/6}$ is 1.79 with m in mg/sec. Using 0.5 millimole of an organic compound diffusion current is found to be 7.3 μA. Given that diffusion coefficient of a compound is $7.3\times10^{-6} cm^2 sec^{-1}$. Calculate the number of electrons involved in the reduction of the compound. **4**

OR

B) In the separation of compound of gallium, indium and thallium by TLC, the respective spots were obtained at 10, 15 and 20 cm. respectively from the base line with solvent front at 25 cm. An unknown compound has R_f value of 0.6. Does it fit any of above metal ? **4**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY (Paper – III) (New)
BO-343 : Pteridophytes, Gymnosperms and Palaeobotany
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) What is meant by Haplostete ?

b) Write any two characters of Sphenopsida.

c) What is the function of ligule in Selaginella ?

d) Why the sporangium of Psilotum called synangium ?

e) What is polyembryony ?

f) Name two common species of Cycas.

g) Which gymnosperm has winged pollen grains ?

h) Mention the type of vascular bundle in Gnetum stem.

i) Define fossil.

j) What is Pentoxylon ?

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

a) Describe strobilus of Selaginella.

b) Describe external morphology of Cycas.

c) Write external and internal morphology of Rhynia.

P.T.O.

3. Write short notes on (**any two**) : **10**

   a) Strobilus of Equisetum.

   b) Female cone of Pinus.

   c) Lepidophyllum.

4. Describe with labelled diagrams male and female cone of Pinus. **10**

   OR

   Give salient features of order Calamitales. Describe external and internal structure of Calamites. **10**

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[4017] – 430

T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY (Paper – VI) (2008 Pattern)
BO-346 : (Pharmacognosy)

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

   a) Define Pharmacognosy.

   b) Enlist different methods of classification of crude drugs.

   c) What is meant by Vipak ?

   d) Define Nutraceutical.

   e) Give chemical test for tannin.

   f) How leha is prepared ?

   g) Give any two factors affecting cultivation of herbal drugs.

   h) Mention two medicinal uses of Aloe.

   i) What is the source of Asafoetida ?

   j) List any four branches of Ethno botany.

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

   a) Give pharmacological classification of crude drugs with suitable examples.

   b) Describe herbal cosmeceuticals.

   c) Comment on different types of adulterants found in crude drugs.

P.T.O.

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

   a) Packing and storage of crude drugs.

   b) Unani system of medicine.

   c) Ethno medicinal uses of Aegle and Azadirachta.

4. Give an account of cultivation, microscopic characters, chemical constituents and medicinal uses of Cinchona. **10**

   OR

4. Give source, microscopic characters, chemical constituents and medicinal uses of Coriandrum. **10**

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[4017] – 434

T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – IV) (2008 Pattern)
ZY-344 : Organic Evolution (New)

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) Mention any one theory for origin of life.
2) What is Era ?
3) What is geographical barrier ?
4) What is phosphagene ?
5) What is acquired character ?
6) Name any two animals from oriental realm.
7) Define species.
8) Give biological name of modern man.
9) What is analogy ?
10) Define fossil.

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

i) Describe methods of animal distribution.
ii) Describe Modern Synthetic Theory of organic evolution.
iii) Describe the faunal peculiarities of palearctic realm.

P.T.O.

3. Write notes on **any two** of the following : **10**
   a) Pre-zygotic and post-zygotic isolating mechanism
   b) Lamarckism
   c) Cro-Magnons
   d) Classification of animal distribution.

4. Define Isolation. Explain in detail any four types of isolation mechanism. **10**

OR

4. What is organic evolution ? Explain how physiological and biochemical evidences support the organic evolution.

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[4017] – 435

T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – V) (2008 Pattern)
ZY–345 (a) : Public Health & Hygiene
(New)

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) State any two methods for small scale purification of water.
   2) Name any two methods of food preservation.
   3) Name the artificial methods of ventilation.
   4) What is health ?
   5) State any two properties of soil.
   6) State full forms of WHO.
   7) What are non-communicable diseases ?
   8) Give any two effect of pets on human health.
   9) What is an accident ?
   10) State any two man made sources of radiation.

2. Attempt **any two** of the following : **10**
   1) Describe sanitary well.
   2) What are beverages ? Describe non alcoholic beverages.
   3) Explain natural ventilation.

3. Write notes on **any two** : **10**
   a) Effects of Drugs
   b) Occupational diseases
   c) Standards for Urban housing
   d) Soil borne diseases.

4. Explain the signs, symptoms, mode of infection and control measures of chicken pox. **10**

OR

What is sewage ? Give an account of modern method of sewage treatment.

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P.T.O.

[4017] – 439

T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOLOGY (Paper – III)
GL-343 : Economic Geology
(2008 Pattern) (New)

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 in **2/3** lines. **10**
   a) Define ore.
   b) Define overburdon.
   c) Define eluvial placer deposits.
   d) Name two important oxides of U and Th.
   e) Define fossil fuel.
   f) Name important gold fields in Karnataka State.
   g) Define peat variety of coal.
   h) Name important localities of Cr-deposits.
   i) Define zone of oxidation.
   j) Give the composition of Raniganj coal.

2. Answer **any two** of the following : **10**
   a) Describe beach placer deposits.
   b) Explain wall rock alteration.
   c) Describe surface indications of petroleum.

3. Answer **any two** of the following : **10**
   a) Describe bituminous and anthracitic coal varieties.
   b) Give the mineralogy of Cu and Fe deposits of India.
   c) Describe fissure vein and its types.

4. Give the mineralogy, geology and geographical distribution of Mn deposits. Add a note on its uses. **10**

OR

4. Describe the origin of coal. Add a note on occurrence of coal deposits in Maharashtra. **10**

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[4017] – 440

T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOLOGY (Paper – IV) (2008 Pattern)
GL-344 : Geotectonics
(New) (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 in **2/3** lines : **10**

a) Name the type of collision which generated Himalayan mountain.

b) Name any two tectonic plates of Southern hemisphere.

c) Name any two Indian mountains of residual type.

d) What is magnetic inclination ?

e) Give two important characteristics of core.

f) What is epeirogenesis ?

g) Give the important characteristics of P-wave.

h) What are convergent plate boundaries ?

i) Give two important characteristics of back-arc basins.

j) What is low velocity zone ?

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

a) Magnetic data for sea floor spreading.

b) Plate boundaries.

c) Plumes and hot spots.

P.T.O.

3. Write notes **(any two)** : **10**

   a) Orogenic mountains

   b) Triple junction

   c) Thermal cycle hypothesis.

4. Explain how thermal cycle hypothesis explains the formation of mountains. **10**

OR

4. Describe the mechanism of plate-motion due to convention mechanism and thermal boundary layer concept. **10**

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[4017] – 449

T.Y.B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (Paper – I)
Gg – 341 : Principles and Techniques of Watershed Management
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Note : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** diagrams and maps **where** necessary.*
*4) Use of map-stencils is **allowed**.*

1. Answer the following in **one** or **two** sentences. **10**

a) Define watershed management.

b) List any two types of surveys required for watershed.

c) What is resource mapping in watershed management ?

d) What are check dams ?

e) What is food security ?

f) What is participatory planning ?

g) State two reasons for the need for watershed planning.

h) Name two storage methods for harvested water.

i) Name two soil conservation methods.

j) Name two watershed based farming systems.

2. Write short answers (**any two**) : **10**

a) Cost sharing in Watershed Development

b) Participatory rural appraisal

c) How is landscape restored by watershed planning ?

P.T.O.

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

   a) Database generation for watershed.

   b) GIS in resource appraisal for watershed.

   c) Importance of watershed planning.

4. Discuss the traditional methods of water harvesting in different parts of India. **10**

   OR

   Discuss the various rural watershed development plans.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MICROBIOLOGY (Paper – III) (2008 Pattern) (New)
MB-343 : Metabolism

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. Attempt the following : **10**

a) Define following :
   i) Facilitated transport
   ii) Entropy

b) In glycogen biosynthesis glucose donor is ATP-glucose-state true or false.

c) _____ is electron donor in oxygenic photosynthesis.

d) Write mathematical equation for determination of ΔG^0.

e) In anaerobes which system is used for transport of sugars.

f) State third law of thermodynamics.

g) Which is the target site for α-amylase on starch ?

h) Name any two photosynthetic pigments in bacteria.

i) What is the role of Shine Dalgarno sequence in protein synthesis ?

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

a) Explain active transport.

b) Justify : ATP is energy compound.

c) Comment on photosynthetic pigments and apparatus in bacteria.

P.T.O.

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

   a) Diagrammatically represent photosynthetic ETC in green bacteria.

   b) Explain termination of protein synthesis.

   c) Explain Urea cycle.

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

   a) What is substrate level and oxidative phosphorylation ? Describe chemiosmotic coupling hypothesis for ATP generation.

   b) Explain steps in biosynthesis of palmitic acid.

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[4017] – 462

T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE
EL – 342 : Embedded Systems (Paper – II)
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** the following :

   a) Write the magnitude of signed integer. **(1)**

   b) The bit data type is used only for RAM single bit addressable location (True/False). **(1)**

   c) State which data type you would use for indicating no. of months in a year. **(1)**

   d) Which one take more space : Packed BCD or ASCII ? **(1)**

   e) Which pins of 8051 microcontroller are set aside for serial communication and what are their function ? **(2)**

   f) Find the content of P3 after execution of the following **(2)**
   P2 = 00;
   P2 = P2 | OX99;
   P3 = ~ P2

   g) What are the advantages of using 'C' for 8051 microcontroller programming ? **(2)**

   h) Indicate selection mode in the statement. "TMOD = OX20;" **(2)**

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

   a) Explain with suitable example bitwise logic operaters in 8051 C programming. **(4)**

   b) Interface suitable RTC to 8051 µc and explain its address map. **(4)**

   c) Write 8051 C program to create frequency 2500 Hz on $P_{2.7}$. Use timer one, mode two to create the delay. **(4)**

P.T.O.

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

   a) Explain PWM based DC motor speed control using 8051 µc with suitable C program. **(4)**

   b) Explain RS 232 standard and its handshaking signals. **(4)**

   c) Write a C program for 8051 to transfer the letter "E" serially at 4800 baud continuously use 8 bit data, 1 stop bit. **(4)**

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

   a) Write a C program that finds the number of zero's in 8 bit data item. **(6)**

   b) For 4×4 keyboard interfacing with 8051 µc, indicate the steps to identify the pressed key. **(6)**

   c) State the advantages of LCD interfacing. Draw LCD timing diagram for write operation. **(6)**

OR

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

   a) For 8 KB RAM, explain an address decoding scheme using simple gates to RAM to 8051 µc. **(4)**

   b) Write 8051 C program to receive 8 bit data from P0 and P1 perform AND operation of received data and send it to port two (P2). **(4)**

   c) What is RS-485 converter ? Explain its use. **(4)**

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[4017] – 467

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE & STRATEGIC STUDIES (2008 Pattern) (New)
DS-341 : Management of Military Technology in India (Paper – I)

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) Introduce 'India.
   2) What is meant by 'Global Power' ?
   3) What is 'Acquisition' ?
   4) Define 'Technology Absorption'.
   5) Define 'Nano Technology'.
   6) Write the purpose of "Dual use Technologies".
   7) What is 'Defence Industrialisation' ?
   8) Define 'Strategy'.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Write the significance of Science and Technology education in India.
   2) Write the role of R & D in defence preparedness.
   3) Write the advantages of dual use technologies.

3. Write short notes on (**any two**) : **8**
   1) Technology Forecasting
   2) Transfer of Technology
   3) Technology Management.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Do you think that India is a rising global power ? Give your opinion.
   2) Discuss the application of first grade technology in the weapon development.

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[4017] – 476

T.Y. B.Sc. (Semester – IV) Examination, 2011
ENVIRONMENTAL SCIENCE (Paper – II) (2008 Pattern)
ENV-342 : Nature Conservation (New Course)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) 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 are the 2 protected areas provided by the Indian legislation ?
   b) Define species.
   c) Define any 2 'status of existence'.
   d) Give any 2 penalties under the Wildlife Protection Act.
   e) Define wildlife.
   f) Give any 2 environmental personalities in the field of conservation.
   g) What is meant by ex-situ conservation ?
   h) What is the full form of IUCN ?
   i) What are natural heritage sites ?
   j) What are gene banks ?

2. Answer **any two** of the following : **10**
   a) Discuss the 'schedules' according to Wildlife Protection Act.
   b) Describe the administrative set-up and functions of Central and State Pollution Control Board.
   c) Discuss the Ecosystemic Approach in conservation.

3. Write notes on **any two** : **10**
   a) Convention on Biological Diversity.
   b) International Whaling Mission.
   c) Ecotourism – objectives and challenges.

4. Answer **any one** : **10**
   a) Discuss the role of international conventions and protocols in nature conservation.
   b) Discuss the challenges and merits each of in-situ and ex-situ conservation.

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[4017] – 480

T.Y. B.Sc. (Semester – IV) Examination, 2011
ENVIRONMENTAL SCIENCES
(New Course) (Paper – VI) (2008 Pattern)
ENV- 346 : Environmental Biotechnology – II

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 bioleaching.
   b) Define biofilm reactors.
   c) What is biological treatment ?
   d) Mention types of bioleaching.
   e) What are biological filters ?
   f) State the names of 2 aquatic plants used for waste water treatment.
   g) What is Bioaugmentation ?
   h) Which microorganisms are used in Bioleaching ?
   i) What is meant by activated sludge ?
   j) What are facultative aerobic bacteria ?

2. Write a short note on **(any two)** : **10**
   a) UASB process for anaerobic biological treatment.
   b) Phytostabilization.
   c) Biosorption technique for removal of phosphate pollutants.

3. Answer **any two** from the following : **10**
   a) Describe Environmental variations in field.
   b) Discuss various factors affecting biomethanation.
   c) Explain the biochemistry of waste water treatment.

4. Attempt **any one** of the following question : **10**
   a) Describe in detail microbial metabolism of pesticides and other Xenobiotic components.
   b) Discuss the need for research and development in Bioremediation.

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[4017] – 488

T.Y.B.Sc. (Semester – IV) Examination, 2011
INDUSTRIAL CHEMISTRY (Vocational) (Paper – VI)
Inorganic and Organic Based Industries – II
(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. Answer the following questions : **10**
   a) Define the term thermoplastic polymer.
   b) Explain addition polymerisation with one example.
   c) Define the term detergent.
   d) Give two examples of anaesthetics.
   e) What is nitromusk ? Give one example.
   f) Define chromogen term.
   g) What is auxochrome ?
   h) What are elastomers ? Give one example.
   i) Define vehicles used in perfumes.
   j) What is diuretics ?

2. A) Attempt **any two** of the following : **6**
      a) Distinguish between thermoplastic and thermoelastic polymers. (4 points each).
      b) Explain synthesis of benzocaine.
      c) State requirements of a good fibre.

   B) Attempt **any two** of the following : **4**
      a) Explain preparation of phenophthalein.
      b) Explain any two special soap products.
      c) Give properties of synthetic fibre.

P.T.O.

3. Write a note on **any two** of the following : **10**
   a) Tranquilizers
   b) Synthesis of vanilline
   c) Pressure sensitive adhesives.

4. A) Explain synthetic rubber with example of polybutadiene. **6**

   OR

   A) What are surfactants ? Give its classification. **6**

   B) Attempt **any one** of the following : **4**
      a) Explain the manufacture of soap by continuous process.
      b) Give synthesis and uses of paracetamol.

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[4017] – 402

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – II)
MT:342 – Complex 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) Let $f(z) = \left(\frac{z}{\bar{z}}\right)^2, z \neq 0$
$= 0, \ z = 0.$

Show that f is discontinuous at z = 0.

ii) If $f(z) = \bar{z}$ then show that $f'(z)$ doesn't exist at any point z.

iii) Show that $u(x, y) = 2x - x^3 + 3xy^2$ is a harmonic function.

iv) Show that $\log(1 - i) = \frac{1}{2} ln\ 2 - \frac{\pi}{4} i$

v) Evaluate $\int_C \frac{\cos z}{z(z^2+8)} dz$, where C is the positively oriented boundary of the square whose sides lie along the lines $x = \pm 2, \ y = \pm 2$.

vi) Obtain the Taylor series $e^z = e \sum_{n=0}^{\infty} \frac{(z-1)^n}{n!}$, $(|z-1| < \infty)$ by writing $e^z = e^{z-1}.e$.

vii) Define essential singularity of f(z). Give an example of a function f(z) having an essential singularity.

P.T.O.

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

   i) If $f(z_0) = g(z_0) = 0$ and $f'(z_0), g'(z_0)$ exist, where $g'(z_0) \neq 0$ then show that $\lim_{z \to z_0} \frac{f(z)}{g(z)} = \frac{f'(z_0)}{g'(z_0)}$.

   ii) If $f'(z) = 0$ everywhere in a domain D, then prove that f(z) is a constant function throughout D.

   iii) If $f(z) = u + iv$ is an analytic function in a domain D, then prove that v is a harmonic conjugate of u.

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

   i) Let $f(z) = \begin{cases} 1, & \text{if } y < 0 \\ 4y, & \text{if } y > 0 \end{cases}$

   and C be the arc from $z = -1 - i$ to $z = 1 + i$ along the curve $y = x^3$.

   Evaluate $\int_C f(z)dz$.

   ii) If f is an analytic function over and inside a closed contour C and f' is continuous there, then prove that $\int_C f(z)\,dz = 0$.

   iii) If f(z) is an analytic function over and inside positively oriented circle C centred at z_0 and with radius R and if M is the maximum value of $|f(z)|$ on C, then show that $\left|f^{(n)}(z_0)\right| \leq \frac{n!M}{R^n}$ $(n = 1,2,3,...)$.

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

   i) a) Evaluate $\int_C \frac{(3z+2)^2}{z(z-1)(2z+5)}\,dz$ where C is the positively oriented circle $|z| = 3$.

   b) Using residues evaluate $\int_0^\infty \frac{x^2}{(x^2+g)(x^2+4)^2}\,dx$.

ii) a) Find the Cauchy principal value of $\int_{-\infty}^{\infty} \frac{x^2}{x^6+1}\, dx$.

b) Let the function $f(z) = u(x,y) + iv(x,y)$ be defined throughout same ε-neighbourhood of a point $z_0 = x_0 + iy_0$, and suppose that the first order partial derivatives of the functions u and v with respect to x and y exist everywhere in that neighbourhood. If those derivatives are continuous at (x_0, y_0) and satisfy Cauchy-Riemann equations $u_x = v_y$ and $u_y = -v_x$ at (x_0, y_0), then prove that $f'(z_0)$ exists.

[4017] – 402

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – II)
MT:342 – Complex 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) Let $f(z) = \left(\frac{z}{\bar{z}}\right)^2, z \neq 0$
$= 0, \ z = 0.$

Show that f is discontinuous at z = 0.

ii) If $f(z) = \bar{z}$ then show that $f'(z)$ doesn't exist at any point z.

iii) Show that $u(x, y) = 2x - x^3 + 3xy^2$ is a harmonic function.

iv) Show that $\log(1 - i) = \frac{1}{2} ln\ 2 - \frac{\pi}{4} i$

v) Evaluate $\int_C \frac{\cos z}{z(z^2+8)} dz$, where C is the positively oriented boundary of the square whose sides lie along the lines $x = \pm 2, \ y = \pm 2$.

vi) Obtain the Taylor series $e^z = e \sum_{n=0}^{\infty} \frac{(z-1)^n}{n!}$, $(|z-1| < \infty)$ by writing $e^z = e^{z-1}.e$.

vii) Define essential singularity of f(z). Give an example of a function f(z) having an essential singularity.

P.T.O.

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

   i) If $f(z_0) = g(z_0) = 0$ and $f'(z_0), g'(z_0)$ exist, where $g'(z_0) \neq 0$ then show that $\lim_{z \to z_0} \frac{f(z)}{g(z)} = \frac{f'(z_0)}{g'(z_0)}$.

   ii) If $f'(z) = 0$ everywhere in a domain D, then prove that f(z) is a constant function throughout D.

   iii) If $f(z) = u + iv$ is an analytic function in a domain D, then prove that v is a harmonic conjugate of u.

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

   i) Let $f(z) = \begin{cases} 1, & \text{if } y < 0 \\ 4y, & \text{if } y > 0 \end{cases}$

   and C be the arc from $z = -1 - i$ to $z = 1 + i$ along the curve $y = x^3$.

   Evaluate $\int_C f(z)dz$.

   ii) If f is an analytic function over and inside a closed contour C and f' is continuous there, then prove that $\int_C f(z)\,dz = 0$.

   iii) If f(z) is an analytic function over and inside positively oriented circle C centred at z_0 and with radius R and if M is the maximum value of $|f(z)|$ on C, then show that $\left|f^{(n)}(z_0)\right| \leq \frac{n!M}{R^n}$ $(n = 1,2,3,...)$.

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

   i) a) Evaluate $\int_C \frac{(3z+2)^2}{z(z-1)(2z+5)}\,dz$ where C is the positively oriented circle $|z| = 3$.

   b) Using residues evaluate $\int_0^\infty \frac{x^2}{(x^2+g)(x^2+4)^2}\,dx$.

ii) a) Find the Cauchy principal value of $\int_{-\infty}^{\infty} \frac{x^2}{x^6+1}\, dx$.

b) Let the function $f(z) = u(x,y) + iv(x,y)$ be defined throughout same ε-neighbourhood of a point $z_0 = x_0 + iy_0$, and suppose that the first order partial derivatives of the functions u and v with respect to x and y exist everywhere in that neighbourhood. If those derivatives are continuous at (x_0, y_0) and satisfy Cauchy-Riemann equations $u_x = v_y$ and $u_y = -v_x$ at (x_0, y_0), then prove that $f'(z_0)$ exists.

[4017] – 403

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – III)
MT-343 : Problem Course based on MT – 341 and MT – 342
(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.*

*3) Use **separate** answer books for **each** Section.*

*4) Tie the **both** answer books together.*

SECTION – I
(Metric Spaces)

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

i) Give two distinct subsets of the metric space R^2 which are neither open and closed.

ii) Write interiors of Q and [0, 1) in R^1.

iii) Give an example of a connected metric space which is not compact and an example of a compact metric space which is not connected.

iv) Give an example of a family of open subsets of R^1 whose intersection is not open.

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

i) Show that any discrete metric space is complete.

ii) Let (X, d) be a metric space. Fix $x \in X$. Show that the function f_x defined by $f_x(y) = d(x, y)$, $y \in X$ is a continuous function on X.

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

i) Let X, Y be metric spaces. Let f, g : $X \to Y$ be continuous functions. Show that the set $E = \{x \in X / f(x) = g(x)\}$ is a closed subset of X.

ii) Show that any compact metric space is totally bounded.

iii) Show that a circle, a line and a parabola in R^2 are not homeomorphic to a hyperbola.

P.T.O.

SECTION – II

(**Complex Analysis**)

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

   i) Show that $\exp\left(\frac{2+\pi i}{4}\right)=\sqrt{\frac{e}{2}}(1+i)$.

   ii) Evaluate $\int_c e^{1/z}\,dz$, where C is the unit circle |z | = 1.

   iii) Evaluate $\int_c \frac{1}{z^2+2z+2}\,dz$ where C is the positively oriented circle |z| = 1.

   iv) Derive the expression $\frac{\sinh z}{z^2}=\frac{1}{z}+\sum_{n=0}^{\infty}\frac{z^{2n+1}}{(2n+3)!}(0<|z|<\infty)$.

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

   i) Without evaluating the integral, show that $\left|\int_c \frac{dz}{z^2-1}\right|\le\frac{\pi}{3}$, where C is an arc of the circle |z | = 2 from z = 2 to z = 2i.

   ii) Find the Laurent series that represents the function $f(z)=z^2\sin\left(\frac{1}{z^2}\right)$ in the domain $0 < |z| < \infty$.

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

   i) Find dl roots of the equation sin z = cosh 4.

   ii) Evaluate $\int_c \bar{z}\,dz$ where C is the right half of the circle |z| = 2 from z = – 2i to z = 2i.

   iii) Find the poles of functions $f(z)=\frac{\sinh z}{z^4}$ and $g(z)=\frac{\cosh z}{z^4}$. Determine their orders and residues of f(z) and g(z) at those poles.

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[4017] – 404

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – IV)
MT 344 : Ring 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 an example of a finite non commutative ring and an example of an infinite non commutative ring.

   ii) A ring element is called an idempotent if $a^2 = a$. Prove that the only idempotent in an integral domain is either 0 or 1.

   iii) Show that the only ideals of a field F are {0} and F.

   iv) Determine all ring homomorphisms from Z to Z.

   v) List all the monic irreducible polynomials of degree 2 in $Z_3[x]$.

   vi) Determine whether the polynomial $x^5 + 9x^4 + 12x^2 + 6$ is irreducible over Q.

   vii) Show that 1 – i is irreducible in Z[i].

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

   i) Prove that a finite integral domain is a field.

   ii) Prove that every maximal ideal is a prime ideal but not conversly.

   iii) Let R be a commutative ring of prime characteristic p. Show that the Frobenius map $x \to x^p$ is a ring homomorphism from R to R.

P.T.O.

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

   i) If D is an integral domain, then show that D[x] is an integral domain.

   ii) Show that the number of reducible polynomials over Z_p of the form $x^2 + ax + b$ is $\frac{P(P+1)}{2}$.

   iii) Prove that every Euclidean domain is a principal ideal domain.

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

   i) a) In an integral domain, prove that every prime element is an irreducible element. **5**

   b) In Z[i], show that 3 is an irreducible but 2 and 5 are not. **5**

   ii) a) State and prove the Ascending chain condition for a PID. **7**

   b) If a and b are associates in an integral domain D then show that $<a> = <b>$. **3**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – V)
MT- 345 : Partial Differential Equations
(2008 Pattern) (New Course)

Time : 2 Hours Max. Marks : 40

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

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

i) Find the general integral of

$$\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}.$$

ii) Find the integral curves of the equations

$$\frac{dx}{mz - ny} = \frac{dy}{nx - lz} = \frac{dz}{ly - mx}.$$

iii) Verify the condition of integrability for $zdx + zdy + z(x + y + \sin z)\,dz = 0$.

iv) Eliminate the arbitrary function F from $z = x + y + F(xy)$

v) Explain the method of solving a first order partial differential equation

$f(p, q) = 0$.

vi) Find the complete integral of Clairaut's partial differential equation

$Pqz = P^2(xq + P^2) + q^2(yp + q^2)$

vii) Find the general solution of $xp + yq = z$.

P.T.O.

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

   i) Find the integral curves of the equations
   $\frac{dx}{x^2(y^3-z^3)} = \frac{dy}{y^2(z^3-x^3)} = \frac{dz}{z^2(x^3-y^3)}$.

   ii) Find the equation of the system of curves on the cylinder $2y = x^2$ orthogonal to its intersection with the hyperboloids of the one parameter system
   $xy = z + c$.

   iii) If X is a vector such that X. Curl X = 0 and μ is an arbitrary function of x, y, z then prove that (μX). Curl (μ X) = 0.

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

   i) Verify that $(y^2 + yz)\,dx + (xz + z^2)\,dy + (y^2 - xy)\,dz = 0$ is integrable and find its primitive.

   ii) Eliminate the arbitrary constants a and b from the equation
   $z^2(1 + a^3) = 8\,(x + ay + b)^3$ and find the corresponding partial equation.

   iii) State and prove the necessary and sufficient condition for the integrability of $dz = \phi\,(x, y\, z)\,dx + 4\,(x, y, z)\,dy$.

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

   i) a) Explain Charpit's method for solving the partial differential equation
   $f\,(x, y, z, p, q) = 0$

   b) Find a complete integral of $xpq + yq^2 - 1 = 0$.

   ii) a) Explain Jacobi's method to find complete integral of
   $f\,(x, y, z, p_1, p_2, p_3) = 0$.

   b) Find the general integral of the linear partial differential equation
   $y^2p - xyq = x\,(z - 2y)$

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – VI)
MT-346: Problem Course Based on MT-344 and MT-345
(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) Use ***separate*** *answer book for* ***each*** *Section.*
4) ***Tie*** *both the answer books together.*

SECTION – I
(Ring Theory)

1. A) Attempt **any three** of the following : **(6)**
   i) Describe all zero divisors and units of $Z \oplus Q \oplus Z$
   ii) Give an example of a right ideal of a ring which is not a left ideal.
   iii) Is the ring 2Z isomorphic to 3Z ? Justify your answer.
   iv) Show that x^2+1 is irreducible in Z_3.

   B) Attempt **any one** of the following : **(4)**
   i) Suppose that there is a positive even integer n such that $a^n = a$ for all a of some ring. Show that $-a = a$ for all a in that ring.
   ii) Show by giving an example that a prime ideal may not be a maximal ideal in a ring. Justify your answer.

2. Attempt **any two** of the following : **(10)**
   i) Determine all ring homomorphisms from Z_{20} to Z_{30}.
   ii) For any prime P, show that the cyclotomic polynomial

$$Q_P(x) = \frac{x^p - 1}{x - 1} = x^{P-1} + x^{P-2} + - - + x + 1$$ is irreducible over Q.

   iii) Determine all units in Z [i].

P.T.O.

SECTION – II

(Partial Differential Equations)

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

   i) Eliminate the arbitrary function F from the equation $Z = xy + F(x^2 + y^2)$.

   ii) Find the primitive of the differential equation $xdy - ydx - 2x^2zdz = 0$.

   iii) Find the general solution of $yzp + xzq = xy$.

   iv) Explain the method of solving the first order differential equation $f(p, q) = 0$.

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

   i) Show that $p^2 + q^2 = 1$ and $(p^2 + q^2)\, x = pz$ are compatible equations.

   ii) Solve the partial differential equation $z^2 + zu_z = u_x^2 - u_y^2 = 0$ by Jocobi's method.

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

   i) Find the complete integral of the partial differential equation $x(1 + y)\, p = y(1 + x)\, q$.

   ii) Show that the equation $z = px + qy$ is compatible with any equation $f(x, y, z, p, q) = 0$ which is homogeneous in x, y, z.

   iii) Find the surface which intersects the surfaces of the system. $z(x + y) = c(3z + 1)$ orthogonally and which passes through the circle $x^2 + y^2 = 1, z = 1$.

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

MATHEMATICS (Paper – VII)

MT – 347 (Elective (B) : Improper Integrals and Laplace Transforms

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

i) Show that $\text{C.P.V.}\int_{-1}^{1}\frac{1}{|x|}dx$ does not exist.

ii) True or false ? If f is continous on [1, ∞) and $\int_{1}^{\infty} f(x)dx$ converges, then $\lim_{x\to\infty} f(x)=0$. Justify.

iii) Show that $\int_{0}^{1}\frac{\sin x}{\sqrt{x}}dx$ converges absolutely.

iv) Find $L\{U(t)\}(s)$, where $U(t)=\begin{cases}1 & t>a\\ 0 & t<a\end{cases}$.

v) Find $L^{-1}\left\{\frac{s}{s^2+4s+1}\right\}(t)$.

vi) Show that L^{-1} is a linear operator.

vii) Find $L\{f(t)\}(s)$ where $f(t)=\begin{cases}0 & 0\le t<2\\ e^t & t\ge 2\end{cases}$.

P.T.O.

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

i) Show that the improper integral $\int_0^1 \frac{1}{x}dx$ diverges.

ii) State and prove the integral test.

iii) Discuss the convergence of $\int_1^\infty \cos(x^2)dx$

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

i) Let f be piecewise continous on [0, ∞). If f is of exponential order α and $L\{f(t)\}=F(s)$ then prove that $\frac{d^nF}{ds^n}=L\{(-1)^n t^n f(t)\}$ for all n = 1, 2... and s > α.

ii) Let f be piecewise continous on [0, ∞) and of exponential order α, with F(s) =L {f (t)} and such that $\lim_{t\to 0^+}\frac{f(t)}{t}$ exists, then prove that $\int_s^\infty F(x)dx = L\left\{\frac{f(t)}{t}\right\}$.

iii) Find $L^{-1}\left\{\frac{s^2}{(s^2-a^2)(s^2-b^2)(s^2-c^2)}\right\}$.

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

i) a) Find L { | sin ωt | }.

b) State and prove comparison test for improper integral of the first kind.

ii) a) Solve by using Laplace transform

$$y''' + y'' = e^t + t + 1,\ y(0) = y'(0) = y''(0) = 0.$$

b) Compute $L\left\{\frac{e^{3t}}{\sqrt{t}}\right\}$.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – VII)
MT – 347 (D) : Dynamics (Elective)
(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) The distance s meters travelled in t seconds by a particle moving along a straight line is given by $s = 2t^3 - 9t^2 + 12t + 6$.

Find when its acceleration becomes zero.

ii) A ball is thrown vertically upwards with a velocity of 30 m/sec. How high will it go ?

iii) If a particle describes a curve $r = ae^{\theta}$, with constant angular velocity, show that its radial acceleration is zero.

iv) A body of mass 25 grams is acted on by a constant force. It acquires a velocity of 2 cm/sec in 5 seconds from rest. How large is the force acting ?

v) Show that the time of fall down of an inclined plane of given base is least when inclination is 45°.

vi) If the maximum horizontal range of a particle is R, show that the greatest height attained is $\frac{1}{4}$ R.

vii) Find law of force for the conic $\frac{l}{r} = 1 + e\cos\theta$.

P.T.O.

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

i) A particle just clears a wall of height b at a distance a from point of projection and strikes the ground at a distance c from the point of projection. Prove that the angle of projection is $\tan^{-1}\left[\frac{bc}{a(c-a)}\right]$.

ii) A train travels a distance S starting from rest and ends at rest. The velocity increases uniformly till it reaches a maximum value V ; and then decreases uniformly. Show that the whole time of motion is $\frac{2S}{V}$.

iii) Derive the energy equation for the orbit of a particle moving under an attractive central force.

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

i) Obtain the expression for velocity of a particle performing simple harmonic motion with mean position at origin and along the X-axis.

ii) Show that the least velocity of projection for projectile from the origin to hit a point (h, k) in X-Y plane is $u = \sqrt{g\left(k + \sqrt{h^2 + k^2}\right)}$.

iii) Two masses in an Atwood's machine are m_1 and m_2. If m_1 ($m_1 > m_2$) descends with acceleration f, show that the mass which must be taken away from it so that it can ascend with the same acceleration is $\frac{4m_1fg}{(f+g)^2}$.

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

i) a) A particle moves in a straight line with a constant acceleration f and initial velocity u, then derive expressions for distance travelled, velocity at instant t.

b) A stone is dropped into an empty pit of depth h and is heard to strike the bottom after t seconds. Prove that $2h\left(1+\frac{gt}{v}\right)=gt^2$, where v is velocity of sound, is so large in magnitude as compared with h that $\left(\frac{h}{v}\right)^2$ can be neglected.

ii) a) Show that a condition for a particle to strike the plane horizontally is $\tan\alpha = \tan\beta$; where α is angle of projection of the particle and β is inclination of the plane.

b) A particle describes a circle with uniform speed V. Find law of force, if it is known that it is directed to a point on the circumference.

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[4017] – 411

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – VII)
MT-347 Elective (E) : Lebesgue Integration
(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) Let E_1 and E_2 be subsets of [a, b]. If $m(E_2 - E_1) = 0$ and $E_1 \cup E_2$ is a measurable set, prove that E_1 is a measurable set.

   ii) If $f(x) = 5$ $(0 \le x \le 1)$, show that f is measurable on [0, 1] using the definition of a measurable function.

   iii) Find ^5f, if $f(x) = \frac{1}{\sqrt[4]{x}}$, $0 < x \le 1$ and f(0) = 0.

   iv) Is the following statement true or false ? Justify. 'If G is an open subset of [a, b] and |G| = 0, then G is empty'.

   v) If E is a countable set, then show that $\overline{m}E = 0$.

   vi) Let $f : [0,1] \to \mathbb{R}$ such that f(x) = 100, for all $x \in [0,1]$. Find $L\int_E f(x)dx$, where E is the set of rationals in [0, 1].

   vii) Is the following statement true or false ? Justify. 'There exists a function which is measurable but not continuous'.

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

   i) Let E be a subset of [a, b]. Show that E is a measurable set if and only if given any $\in > 0$, there exists a closed set $F \subseteq E$ and an open set $G \supseteq E$ such that $|G| - |F| < \in$.

   ii) If G_1, G_2, ... are open subsets of [a, b], prove that $\left|\bigcup_{n=1}^{\infty} G_n\right| \le \sum_{n=1}^{\infty} |G_n|$.

P.T.O.

iii) Let $f(x) = \frac{1}{x}$, $0 < x < 1$

$= 5$, $x = 0$

$= 7$, $x = 1$.

Prove that f is measurable on [0, 1].

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

i) If $\{f_n\}_{n=1}^{\infty}$ is a sequence of measurable functions on [a, b] and if $\lim_{n\to\infty} f_n(x) = f(x)$ almost everywhere on [a, b], then prove that f is measurable.

ii) If E is a measurable subset of [a, b] then prove that $\int_E 1 = mE$.

iii) If f and g are measurable functions on [a, b], then show that f + g is also a measurable function on [a, b].

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

i) Find the Fourier series for the function

$f(x) = -1$, $-\pi \le x < 0$

$= 1$, $0 \le x \le \pi$.

Check whether the Fourier series at x = 0 converges to f(0).

ii) Given that the Fourier series of $f(x) = |x|$, $-\pi \le x \le \pi$ at the point x = 0 converges to f(0), prove that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}.$$

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[4017] – 412

T.Y. B.Sc. (Semester – IV) Examination, 2011
MATHEMATICS (Paper – VII)
(2008 Pattern) (New Course)
MT – 347 : Elective (F) : Computational Geometry

Time : 2 Hours Max. Marks : 40

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

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

i) If we apply shearing in x and y directions by –2 and 2 units respectively onto the rectangle of length 20 cm, then it results into the parallelogram of area 1500 cm^2. Find the breadth of the rectangle.

ii) Explain the terms :

a) Parallel projection

b) Oblique projection

iii) Suppose we apply scalling in x and y co-ordinates by the factors 2 and 3 respectively onto a line of slope 4. Then determine the slope of the resulting line.

iv) Consider the line L parallel to the z-axis and passes through the point (6,4,–2). Write the transformation matrix so that the line L coincides with the z-axis.

v) Find the angle so to generate 10 equidistant points on an elliptical arc in the 1st and 2nd quadrant for $\frac{x^2}{4}+\frac{y^2}{25}=1$.

vi) Find the concatenated transformation matrix to create the bottom view of an object.

vii) Write the parametric equation of the Be'zier curve with three control points.

P.T.O.

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

   i) Prove that , if a 2×2 transformation matrix is applied on a pair of parallel lines then they are transformed to a pair of parallel lines.

   ii) If an object [X] is reflected through the plane Z = 2, then find the transformed object, where $[X] = \begin{bmatrix} 2 & 3 & 4 \\ 4 & -1 & 1 \end{bmatrix}$, using combined transformation matrix.

   iii) Find the concatenated transformation matrix for the following sequence of transformations. First translation in X and Y directions by –5 and 6 units respectively, followed by reflection through Y – axis ; followed by rotation about the origin through an angle 60°.

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

   i) Obtain the diametric projection , if a fore shortening factor along z-direction is $2/5$, (take $\theta > 0, \phi < 0$).

   ii) Obtain four uniformly spaced points in the first quadrant of the unit circle with centre at the origin.

   iii) Rotate the line segment AB, where A[1,2,4] B[2,2,1] about the local X-axis passing through the point P[0,3,4] through an angle 75°.

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

   i) a) Find the parametric equation of a Be'zier curve determined by the control points B_0[0,2], B_1[2,3], B_2[3,2] and B_3[2,0]. Also find the position vector of point on the curve corresponding to parametric value t = 0.4.

   b) Find the cavalier and cabinet projection of the line segment joining A [1 0 1 1] and B [0 1 1 1] with a horizontal inclination angle $\alpha = 30^\circ$.

   ii) a) Generate uniformly spaced 3 points of the parabolic segment of $y^2 = 8x$ in the first quadrant for $4 \le y \le 20$.

   b) Write an algorithm for reflection of an object through the line y = mx+c.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – I)
PH – 341 : Solid State Physics
(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.*
3) ***Use*** *of log tables and calculators is* ***allowed.***

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

a) Define the term 'unit cell'.

b) Sketch (101) plane in SC unit cell.

c) Give the principle of photoelectron spectroscopy.

d) What is 'mobility' ?

e) Give any two applications of STEM.

f) What do you mean by the term 'density of states' ?

g) What is superconductor ?

h) What is curie temperature ?

i) Explain the term 'Band gap energy (E_g).

j) The minimum angle of rotation for a certain crystal structure which leaves it invariant is 120°. Find fold number (n).

2. Attempt **any two** :

a) Describe the crystal structures i) NaCl ii) CsCl with the help of neat diagrams. **5**

b) Write a short note on UV - visible absorption spectroscopy. **5**

c) State and explain 'Meissner effect'. **5**

P.T.O.

3. Attempt **any two** :

   a) A fcc crystal has an atomic radius of 1.342 A°. Find the interplaner spacing for the set of parallel planes having miller indices (200) and (220). **5**

   b) Find packing fraction for BCC crystal structure. Give your comment about the structure. **5**

   c) An n type semiconductor Ge has a donor density of 10^{15} per cm^3. It is arranged in a hall experiment where magnetic field $B_z = 0.5$ Wb/m^2 is applied and a current density of $J_x = 500$ A/m^2 results. What will be the Hall voltage if the specimen is 0.3 cm thick ? **5**

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

   1) On the basis of band theory of solids distinguish between insulators, semiconductors and metals. **8**

   2) What do you mean by ferrimagnetism ? Describe lattice structure of ferrimagnetic materials. What are soft and hard ferrites ? State the applications of ferrites. **8**

   B) Attempt **any one** :

   1) A crystal plane intercepts the three crystallographic axes at $\frac{3}{2}$, 2 and 3. What are Miller indices of the plane ? **2**

   2) Find the longest wavelength that can be analysed by a crystal of spacing 2.55 A° in the third order. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – II)
PH-342 : Quantum Mechanics
(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) ***Use*** *of log tables and calculators is* ***allowed****.*

1. Attempt **all** of the following : **10**

   a) Show that $[x, p_y] = 0$.

   b) Represent graphically the infinitely deep potential well.

   c) Define ground state energy.

   d) Write down relation between phase velocity and group velocity.

   e) Give the meaning of even parity and odd parity of the function.

   f) Define ladder operators.

   g) Find the eigen value of the operator $\frac{d^2}{dx^2}$ for the eigen function $e^{-i\alpha x}$.

   h) What is tunneling effect ?

   i) What do you mean by degeneracy of the energy level ?

   j) Give requirements of wave function.

2. Attempt **any two** :

   a) Show that the phase velocity of the particle of rest mass m_0 and wavelength λ is given by

   $V_p = c\sqrt{1+\left(\frac{m_o c\lambda}{h}\right)^2}$, where c is velocity of light. **5**

P.T.O.

b) Obtain Schrodinger's time independent equation from time dependent equation. Show that time part of wave function is $e^{-iEt/\hbar}$. **5**

c) Show that momentum operator $-i\hbar\frac{\partial}{\partial x}$ is hermitian operator. Obtain eigen functions of momentum operator. **5**

3. Attempt **any two** :

a) A step potential is given by

$V = 0$ for $x \leq 0$

$= V_0$ for $x > 0$

Solve steady state Schrodinger's equation for $E > V_0$ to obtain expression for probability of reflection and transmission across the barrier. **5**

b) Normalise the wavefunction $\psi_{(x)} = \frac{1+ix}{1+ix^2}$. The range of x is from $-\infty$ to $+\infty$. **5**

c) The wave function for a particle in infinite potential well is given as,

$\psi_n(x) = \sqrt{\frac{2}{a}}\sin\left(\frac{n\pi}{a}x\right)$, where $0 \leq x \leq a$.

Find $\langle x \rangle$ and $\langle p_x \rangle$. **5**

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

a) Obtain Schrodinger's equation for rigid rotator with free axis and solve it to obtain energy eigen values and energy eigen functions. **8**

b) i) Discuss the $\gamma - ray$ microscope experiment to illustrate the uncertainty principle. **4**

ii) Prove that eigen values of Hermitian operator are real. **4**

B) Attempt **any one** :

a) The moment of inertia of CO molecule is 1.46×10^{-46} kg – m^2. Calculate the rotational energy in the lowest level of CO molecule.

(Given $\hbar = 1.055\times10^{-34}$ J – S). **2**

b) Find the de-Broglie wavelength of neutron whose energy is 1 eV.

(Given : mass of neutron = 1.676×10^{-27} kg; h = 6.625×10^{-34} J-s). **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – III)
(New) (2008 Pattern)
PH : 343 Thermodynamics and Statistical Physics

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 and calculator is ***allowed****.*
iv) Draw ***neat*** *diagram* ***wherever*** *necessary.*

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

   a) Define Grand canonical ensemble.

   b) What do you understand by priori probability ?

   c) Define Gamma space.

   d) Write Latent heat equation and explain effect of pressure on B.P. of liquid.

   e) Define canonical ensemble.

   f) What are bosons ?

   g) Write the relation between critical temperature and inversion temperature.

   h) Write Boltzamann relation for entropy.

   i) What are symmetric wae functions ?

   j) If $p = q = \frac{1}{2}$ and total number of possibilities are N = 100, find mean value of n_1 i.e. $\bar{n}_1$.

P.T.O.

2. Attempt **any two** :

   a) Using canonical distribution, find magnetic susceptibility of a paramagnetic material. **5**

   b) Explain thermal interaction and mechanical interaction between two systems. **5**

   c) Explain simple random walk problem in one dimension and obtain the probability of finding the particle. **5**

3. Attempt **any two** :

   a) Derive an expression for thermal conductivity of a gas in terms of mean free path. **5**

   b) In case of B.E. statistics prove that $\bar{n}_r = \frac{1}{e^{\beta(\varepsilon_r - \mu)} - 1}$ where symbols have their usual meanings ? **5**

   c) Find mean free path and frequency of collisions of nitrogen from following data :

   Coefficient of viscosity $(\eta) = 1.69 \times 10^{-7}$ Nsm^{-2}

   RMS velocity of molecule (c) = 4.5×10^2 m/s

   Density of nitrogen $(\rho) = 1.25$ kg/m^3. **5**

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

   i) Explain Joule Thompson effect. Obtain Joule Thompson coefficient (μ). **8**

   ii) Obtain mean square deviation $\overline{(\Delta n_1)^2}$ in case of Random walk problem. **8**

   B) Attempt **any one** :

   i) Obtain first Tds equation. **2**

   ii) Compare F.D. and M.B. statistics. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – IV) (New)
PH-344 : Nuclear 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) ***Use*** *of logtable and calculator is* ***allowed****.*

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

   a) What do you mean by isotope ? Give one example.

   b) The mass of $_{30}Zn^{64}$ is 63.9291 a.m.u. Find the packing fraction.

   c) State any two properties of β -particles.

   d) Define half life and mean life of radioactive substances.

   e) What are mesons ?

   f) State any two properties of nuclear forces.

   g) Give any one limitation of shell model of nuclear structure.

   h) Which material is used in solid state counters ?

   i) What do you mean by exothermic nuclear reaction ?

   j) Name the material used as moderator in homogeneous nuclear reactor.

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

   a) What do you mean by binding energy ? Draw the binding energy curve and explain its features. **5**

   b) What are quarks ? Explain the quark model of elementary particles. **5**

   c) What is fusion ? With suitable example explain how energy is liberated during fusion. **5**

P.T.O.

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

   a) A self-quenched G.M. counter operates at 1000 volts and has anode diameter 0.2 mm. The radius of cathode calculate the intensity of electric field. **5**

   b) Determine the Q-value and threshold energy of the reaction.

   $_7N^{14} + 2He^4 \rightarrow {}_8O^{17} + {}_1H^1$

   Given : Mass $_7N^{14}$ = 14.003074 a.m.u., Mass of $_2He^4$ =4.002604 a.m.u.

   Mass of $_8O^{17}$ = 16.99913 a.m.u., Mass of $_1H^1$= 1.007825 a.m.u. **5**

   c) Nuclear reactor is developing energy at the rate of 32 MW. Calculate the number of $_{92}U^{235}$ nuclei fissioned per second if energy released per fission is 200 MeV. **5**

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

   a) Give the theory of successive disintegration of radioactive substances. Explain the different cases of radioactive equilibrium. **8**

   b) What are the assumptions of liquid drop model ? Obtain the semi-empirical mass formula for the mass of nucleus. **8**

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

   a) Find the mass of 1 curie source of C^{14} having half life 5700 yrs. **2**

   b) Determine the spin and parity of $_7N^{15}$. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – VI (F)) (2008 Pattern)
PH-346 : Renewable Energy Sources
(Elective – II) (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) ***Use*** *of log tables and calculators is* ***allowed****.*

1. Attempt **all** of the following : **10**

a) Write a energy balance equation of flat plate collector.

b) What is the principle of solar dryer ?

c) Write applications of solar air heater.

d) Which are the factors affect the nature of wind close to the surface of earth ?

e) Define solar constant.

f) Draw schematic diagram of direct, diffuse and total solar radiation.

g) What are the advantages of solar photovoltaic system ?

h) Define fill factor of solar cell.

i) What is meant by zenith ?

j) Define 'Air mass'.

2. Attempt **any two** :

a) Describe the box type solar cooker with neat diagram. **5**

b) What are main applications of solar photovoltaic system ? Describe one briefly. **5**

c) Explain vertical axis wind mills ? Give its advantages and disadvantages. **5**

P.T.O.

3. Attempt **any two** :

a) Explain construction and working of liquid flat plate collectors. **5**

b) How biogas plants are classified ? Explain briefly. **5**

c) Draw and explain the spectral distribution curve of solar radiations at the earth's surface. **5**

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

a) Draw and explain working of 'Downdraft Gasifier'. **8**

b) What is meant by anaerobic digestion ? What are the factors which affect biodigestion ? Explain briefly. **8**

B) Attempt **any one** :

a) Draw a neat diagram of structure of the sun. **2**

b) Write a short note on silicon solar cell. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – VI) (New) (2008 Pattern)
PH-346 : Elective – II-G: Physics of Nanomaterials

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 table and calculator is* ***allowed****.*

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

a) What is nanoscience ?

b) State two types of CNTs.

c) What happen to the band structure and band gap of nanomaterials ?

d) State Scherrer formula for diffraction from nanomaterials.

e) Enlist four applications of nanomaterials.

f) State two approaches in the synthesis of nanomaterials.

g) State techniques used for characterization of nanomaterials.

h) What is Graphene ?

i) State hazardous effect of nanomaterials.

j) What the word ‘nano’ presents ?

2. Attempt **any two** :

a) Write a note on sputter deposition method for nanomaterial synthesis. **5**

b) Describe the properties of nanomaterial. **5**

c) Write a note on applications of nanomaterial in sports, medical, electronics, biology and health. **5**

3. Attempt **any two** :

a) Explain with diagram, how the porous silicon is formed. **5**

b) What are carbon nanotubes ? How they are synthesized by electric arc discharge ? **5**

c) What happens to the melting point, electrical conductivity and optical property of nanoparticles compared to their bulk ? **5**

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

a) Write a note on "Growth of nanoparticles". Explain transmission electron microscopy for surface morphology and size of nanomaterials. **8**

b) Write a note on synthesis of nanoparticles by chemical vapour deposition. **8**

B) Attempt **any one** :

a) During synthesis of nanostructures, how the morphology is controlled. **2**

b) State the magnitudes of resolution of SEM and TEM. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – VI) (New) (2008 Pattern)
PH-346 :Elective – II-H : Microcontrollers

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 (**1** mark **each**) : **10**

a) What is the size of the flag register in μc-8051 ?

b) Which register bank is used on power up ?

c) What do the mnemonics "A Call" stands for ?

d) Determine the period of machine cycle if the crystal frequency is 16 MHz.

e) In case of unsigned byte-by-byte division, in what register quotient and remainder will be placed ?

f) What is the size of T MOD (timer mode) register ?

g) Define the full duplex data transfer.

h) State the use of T_XD pin in 8051.

i) State the use of SCON register.

j) Give the function of E (enable) of the LCD.

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

a) Explain the operation of stack in 8051 microcontroller. **5**

b) Discuss all flags of 8051 microcontroller. **5**

c) Give the comparison between microprocessor and microcontroller. **5**

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

   a) Write a program to get the X value from P_1 and to send X^2 to P_2 continuously. **5**

   b) Two numbers are stored in registers R_0 and R_1. Write a program to verify if their sum is greater than FFH. **5**

   c) Interface 2×16 line LCD to 8051 and explain in brief. **5**

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

   a) Draw the block diagram of 8051 microcontroller and explain each block in brief. **8**

   b) Explain the addressing modes of 8051 microcontroller with the help of one example. **8**

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

   a) Explain the instruction “CPLA” of 8051. **2**

   b) Explain the “XOR” instruction of 8051. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – VI (D)) (2008 Pattern) (Elective – II)
PH-346 : Electro Acoustics and Entertainment Electronics
(New)

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 table and calculator is* ***allowed****.*

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

a) Give the place theory of hearing.

b) What is the significance of cut off frequency in case of exponential horn ?

c) What is meant by Hi-Fi ?

d) What is a volume compressor ?

e) What do you mean by articulation score ?

f) Give the frequency theory of Hearing.

g) Define directivity factor for a microphone.

h) Give typical frequency response of a carbon microphone.

i) What is meant by dynamic range ?

j) Draw a diagram showing construction of condensor microphone. Give its equivalent circuit.

2. Attempt **any two** :

a) Write a note on Digital Audio Tape. **5**

b) Write a note on Dolyby Noise Reduction. **5**

c) A direct radiator dynamic loudspeaker has a radiation resistance of 2kg/s. Its voice coil is 7.5 m in length and suspended in a magnetic field of 1 Wb/m^2. Determine the acoustic power output for a current of 2A, if the mechanical impedance is 13.3 kg/s. **5**

3. Attempt **any two** :

a) Compare polar response characteristics of cardioid and bidirectional microphones. **5**

b) Draw a diagram showing construction of a moving coil microphone. Discuss the role of tubular vent at the lower chamber of a moving coil microphone. **5**

c) Give acoustic characteristics of the outer ear. **5**

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

a) Compare variable area and variable density motion picture sound recording systems. **8**

b) Discuss the digital audio CD parameters. **8**

B) Attempt **any one** :

a) On a level detector type reverberation time measuring instrument, the upper and lower levels are 2.1 Volts and 1.1 Volts respectively. If the time elapsed between the two levels is 0.11 sec, determine the reverberation time. **2**

b) Write a note on equalizer. **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
PHYSICS (Paper – VI) (New) (2008 Pattern)
PH-346 : Elective – II (J) : Lasers

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 table and calculator is* ***allowed****.*

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

a) What do you mean by stimulated emission ?

b) State any two methods of pumping.

c) What is zero point energy in laser ?

d) Give the condition for population inversion.

e) What is the active material used in tunable dye laser ?

f) What is Rayleigh rang ?

g) Give the advantage of laser welding.

h) State any one use of CO_2 laser.

i) What is hologram ?

j) What do you mean by laser fusion ?

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

a) Obtain the Einstein relations for absorption and emission coefficients. **5**

b) What is line shape broadening ? Give the difference between collision broadening and doppler broadening. **5**

c) Describe the construction and working of ruby laser. **5**

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

a) The wavelength of radiation emitted by the source is 5000 A°. Calculate the temperature at which spontaneous and stimulated emission are equal. **5**

b) The half-width of the gain of a He-Ne laser material is about 2×10^{-3} nm. Find the maximum length of the cavity in order to have a single longitudinal mode oscillation. **5**

c) Explain the use of lasers in isotope separation. **5**

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

   a) State the types of lasers. Describe the construction and working of CO_2 gas laser. **8**

   b) i) State the characteristics of laser. Explain any one characteristics in detail. **4**

   ii) Describe how light amplification is achieved in a laser. **4**

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

   a) Determine the intensity of laser beam having $\lambda = 6328A^\circ$ and the power of 1 mW. **2**

   b) What do you mean by a cavity resonance ? **2**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – I)
CH-341 : Physical 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) **Use** of logarithmic table and calculator is **allowed**.*
*4) Actual calculations **must** be shown while solving **problems**.*

1. Answer the following : **10**

a) Calculate the specific conductance of a solution whose observed resistance is 268 ohms placed in a cell with cell constant 0.98 cm^{-1}.

b) Write the cell reaction of the following cell,

$$Pt\,|\,H_2(g)\,|\,H^+\,\|\,KCl\ soln.\,|\,Hg_2Cl_2(s), Hg\,|\,Pt$$

c) Explain the term 'isotope' with suitable example.

d) What is degeneracy corresponding to $E = \frac{6h^2}{8ma^2}$ for particle in three dimensional box ?

e) What is 'dead time' of counter ?

f) What is 'zero point' energy ?

g) Define the term, 'transport number of ion'.

h) Formulate the cell if cell reaction is ,

$$Zn(s) + 2Fe^{3+} = Zn^{2+} + 2Fe^{2+}$$

i) If the ionic mobilities of cations and anions are 1.8×10^{-4} and 2.1×10^{-4} cm sec^{-1} respectively. Calculate transport number of the anion.

j) ^{14}C has decay constant is 1.2094×10^{-4} $year^{-1}$. Calculate its half life period.

P.T.O.

2. A)Answer the following **(any two)** : **6**

   i) Explain the concept of wave particle duality

   ii) Write briefly on : Metal-metal insoluble salt type of electrode with respect to its

      a) construction

      b) representation and

      c) working

   iii) Describe moving boundary method for the determination of transport number of an ion.

   B) Solve **any one** of he following. **4**

   i) Calculate EMF of the following cell at 25°C.

   $Ca(s)|Ca^{2+}(a=0.1)||Zn^{2+}(a=0.01)|Zn(s)$

   The standard oxidation potentials are

   $E°_{Ca/Ca^{2+}(oxi)} = 2.87$ volt, $E°_{Zn/Zn^{2+}(oxi)} = 0.76$ volt.

   [Given : R = 8.314 Joules mol^{-1} K^{-1}, 1F = 96500 Coulombs]

   ii) Calculate the rate of disintegration per sec. for 2.0 gms of ^{232}Th.

   [Given $t_{1/2}{}^{232}$ Th = 1.39×10^{10} years].

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

   i) Write a note on 'Asymmetric effect' and 'Electrophoretic effect'.

   ii) Derive the expression giving relations between EMF of a cell and thermodynamic functions ΔH and ΔS for the cell reaction.

   iii) Explain the use of radioisotopes as tracer in elucidating reaction mechanism giving two examples.

4. A) State and explain, Heisenberg's uncertainty principle with suitable example. **6**

OR

A) Describe construction and working of G.M. Counter. What are its limitations ?

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

i) At 18°C, the equivalent conductivities at infinite dilution of NH_4Cl, NaOH and NaCl are 129.8, 217.4 and 108.9 ohm^{-1} cm^2 respectively. If the equivalent conductance of 0.1 N NH_4OH solution is 11.45 ohm^{-1} cm^2 what is the degree of dissociation of NH_4OH at this dilution ?

ii) Find out pH of unknown solution at 25°C,

$Pt|Hg,Hg_2Cl_2(s)$ |Sat.KCl| Unknown pH soln.$|H_2Q,Q|Pt$

Ecal(oxi.) = – 0.2415 Volt., E°q(red.) = 0.6997 Volt., Ecell = 0.283 volt.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – II)
CH – 342 : Inorganic 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) ***Actual*** *calculations* ***must be*** *shown.*
iv) Marks are reserved for ***neat*** *and* ***labelled*** *diagrams.*
v) ***Use*** *of log table and calculator is* ***allowed****.*
vi) ***Atomic numbers :*** *Na (11); Mg (12); Al (13); Co (27).*

1. Answer the following : **10**

I) Which is the other metal showing chemical twin with Zr ?

II) Complete the following reaction.

$$^{238}_{92}U \xrightarrow{(\alpha,n)} ? + {}^{1}_{0}n$$

III) Which metal is present in haemoglobin ?

IV) In which reaction, $HCo(CO)_4$ catalyst is used ?

V) Define, 'Intrinsic semiconductor'.

VI) What is the effects of addition of impurity on the electrical conductivity of metal ?

VII) Arrange the elements Na, Mg and Al in decreasing order of their electrical conductivity.

VIII) Which structure is shown by NaCl ?

IX) What is the geometry of crystal, if limiting radius ratio $\left(r_C/r_A\right)$ is 0.732 to 1.0 ?

X) At which site, the dipositive ions are occupied in the normal spinel structure ?

P.T.O.

2. A) Write short notes on **any two** of the following : **6**

i) Oxidation states of transition metal complexes in aqueous media.

ii) Nuclear fission fuels.

iii) Vitamin B_{12}.

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

i) Count the number of electrons in $Co_2(CO)_8$ and state whether it follows 18 electron rule or not ?

ii) Write the applications of semiconductors.

iii) Compare the crystalline and amorphous solids.

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

I) Discuss the catalytic cycle for Wacker's process.

II) What is Born-Haber cycle ? Explain the use of Born-Haber cycle in calculating the lattice energy of NaCl.

III) Explain the n-type and p-type semiconductors with suitable examples using N(E) curve.

4. A) What are transuranic elements ? Explain any two methods of their preparation. **6**

OR

A) Answer the following : **6**

i) Give applications of superconductors.

ii) What are the functions of haemoglobin and myoglobin ?

B) Calculate the CFSE for d^6 and d^7 configurations of high spin and low spin octahedral complexes in terms of Δ_0 . **4**

OR

B) Answer the following : **4**

i) What changes occur in haem group of haemoglobin in going from deoxy to oxyhaemoglobin ?

ii) Name the essential, trace and ultratrace elements necessary for healthy human life.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
Paper – V : CHEMISTRY
CH-345 : 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*** *diagrams and flowsheets* ***wherever*** *necessary.*

1. Answer the following : **(10)**

1) What is a fiber glass ?
2) Explain the term auxochrome.
3) What is role of retarder in cement ?
4) What is meant by "Red Shift" ?
5) What is composition of Portland cement ?
6) Explain the term "Antihistamine".
7) What are medicated soaps ?
8) Define the term "Octane number".
9) What are hydrophobic groups ? Explain with example.
10) What is bio-diesel ?

2. A) Answer the following **(any two)** : **(6)**

1) Discuss raw materials used for making ceramics.
2) What are physical properties of glass ?
3) What do you mean by surfactant ? What are their properties ?

P.T.O.

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

1) Describe the Low Temperature Carbonisation of coal.
2) What are different fractions obtained in crude oil distillation ?
3) What are qualities of good dye ?

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

1) Discuss setting and hardening of cement.
2) Describe the manufacture of soap with flowsheet diagram.
3) Give the synthesis and uses of
   i) Paracetamol.
   ii) Sulphanilamide.

4. A) Explain the following glass forming methods.

a) Pressing b) Blowing
c) Drawing d) Rolling. **(6)**

OR

A) Give the synthesis and uses of
   a) Methyl orange
   b) Crystal violet.

B) What is LPG ? Describe the manufacture of LPG. **(4)**

OR

B) What are qualities of good drug.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – VI)
CH-346 (A) : Nuclear 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.*

1. Answer the following : **(10)**

a) In the fission of 1 kg of $^{235}\cup$, the energy released in 1 day will be _____

i) 9.5×10^{5} MW ii) 9.5×10^{-5} MW

iii) 9.5×10^{-2} MW iv) 9.5×10^{2} MW

b) What are the prompt and delayed neutrons ?

c) State different types of nuclear accelerators.

d) State the principle of Vande-Graft accelerator.

e) Which are the two moderators used in nuclear reactors ?

f) What is the value of average number of fission neutron (ν) for $^{235}\cup$?

g) Which radioisotope is used to determine age of water sample ?

h) State one example of radiometric titration.

i) State the principle of cow and milk system.

j) Which are the two safety precautions taken while handling radioactive substance ?

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

a) Explain the principle of breeding. Explain fast breeder test reactor at Kalpkkam.

b) What are semiconductors ? State the principle and working of semiconductor detector.

c) State the principle of isotope dilution method with suitable example.

P.T.O.

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

a) Write short notes on theory of nuclear fission.

b) What are the biological effects of radiations ?

c) Write short notes on Szilard-Chalmer reaction.

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

a) Define scintillator. State different types of scintillators used in scintillation counter. Discuss the principle and working of scintillation counter.

b) State the principle of neutron activation analysis. Explain its various applications. What are the advantages of the method ?

c) Explain the principle and working of cyclotron.

4. A) Explain the process of nuclear fission. Explain mass and charge distribution for nuclear fission. **(6)**

OR

A) Explain the principle and working of cyclotron with neat diagrams. **(6)**

B) Describe the method of preparation of the following radioisotope. **(4)**

1) Carbon-14 2) Sulphur-35

3) Hydrogen-3.

OR

B) Explain the principle and working of linear accelerator. **(4)**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – VI)
CH-346 (B) : Polymer 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) Draw diagrams **wherever** necessary.*

1. Answer the following : **(10)**

i) Define the term – plastic.

ii) Explain the term – Polymer degradation.

iii) Tg value of polyethylene teraphthalate is 69°C.

iv) Explain the term – Heterochain polymers.

v) Define the term – Crystallisability.

vi) What is meant by transparency of polymer ?

vii) Write the structure of polyvinyl alcohol.

viii) Explain the meaning of the term – sizing.

ix) Draw the structure of syndiotactic polymer.

x) Define the term– vulcanization.

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

i) Explain the role of plastisizers on glass transition temperature (GTT).

ii) Distinguish between homopolymers and copolymers.

iii) Give a brief account of mechanical degradation.

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

i) Explain the terms :

a) Abrassion resistance.

b) Flammability.

ii) The natural rubber has a coiled structure while gutta-percha having rod-like structure. Explain.

iii) How will you characterize polyacrylonitrile and polystyrene polymer by using IR-spectroscopy ?

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

i) Write an account of biodegradable polymers.

ii) Give the methods of preparation, properties and important uses of the following :

a) P-F resins.

b) Polychloroprene.

iii) Short note on : Thermogravimetric Analysis (TGA) in polymer testing.

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

i) Describe extrusion technique in polymer processing in detail.

ii) What is fibre spinning ? Describe dry spinning process.

iii) Write short note on : Reinforcement technique.

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

i) Effect of molecular weight on glass transition temperature (GTT).

ii) Foaming technique.

iii) Post-treatment of fibres.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – VI)
CH-346 (C) :Biochemistry
(2008 Pattern) (New)

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.*

I. Answer the following : **(10)**

1) What is a template DNA ?
2) Name pathway which synthesises glucose from pyruvate.
3) What is a nucleotide ?
4) Give structure of ATP.
5) How many ATPs are formed in one pass β oxidation ?
6) What is oxidative phosphorylation ?
7) Give transamination reaction of alanine.
8) What are nucleases ?
9) Name the enzyme involved in biosynthesis of RNA.
10) What is catabolism ?

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

1) Give reactions of glycolysis in which ATPs are utilized.
2) How fatty acids are transported to Mitochondrial matrix ?
3) Enlist the components of ETC.

B) Answer of the following (**any two**) : **(6)**

1) Discuss conversion of pyruvate to acetylCoA.
2) Give structure and function of transcriptase.
3) Give short account of oxidative deamination.

III. Answer the following (**any two**) : **(10)**

a) Discuss Avery and Macleod experiment.

b) Discuss semiconservative DNA replication.

c) Write short account on central dogma of molecular biology.

IV. a) Discuss reactions of TCA cycle. Give energetics. **(6)**

OR

a) Discuss initiation, elongation and termination steps of translation.

b) Write note on (**any one**) : **(4)**

1) Gene therapy 2) Genetic code.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – VI)
CH-346 (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 **wherever** necessary.*
*iv) Flow sheet/block diagrams and reactions must be given **wherever** necessary.*

1. Answer the following in brief : **10**

i) What is meant by sedimentation in waste water treatment ?

ii) What is sludge-digestion ?

iii) Define : Pyrolysis.

iv) Which method is commonly used to monitor atmospheric CO ?

v) Mention any two materials used for packing of column in HPLC.

vi) Mention any two types of detectors used in GC.

vii) Mention any two applications of AAS in environmental analysis.

viii) What is 'Green gas technology' ?

ix) What is 'Global warming' ?

x) Ozone layer is a protective umbrella of earth. Why ?

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

i) Explain 'electrodialysis' technique.

ii) Outline the method used for municipal water treatement.

iii) Explain incineration process to dispose municipal solid waste.

b) Write short notes on **any two** of the following : **4**

i) Glass electrode.

ii) Nuclear fission fuel.

iii) Climatic effects of ozone depletion.

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

i) What is industrial waste water treatment ? Explain use of ion exchange method for the same.

ii) Explain spectrophotometric determination of SO_2.

iii) Explain the mechanism of ozone depletion.

4. a) Explain any two applications of GC. **6**

OR

a) Explain principle and working of AAS.

b) Write short note on **any one** of the following : **4**

i) Non-conventional energy sources.

ii) Green house effect.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
CHEMISTRY (Paper – VI)
CH-346 (E) : Dairy Chemistry (New)
(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.*

1. Answer the following : **10**

1) What are minor constituents of milk ?

2) Define the term ‘pathogens’.

3) The pre-heated milk can be filtered efficiently’. Why ?

4) Give advantages of vitaminised milk.

5) Give classification of carbohydrates.

6) List milk preservatives used.

7) Give the uses of cheese.

8) Define ‘Shrikhand’ and give its uses.

9) Give advantages of homogenisation.

10) Name the vitamins present in ice-cream.

2. a) Answer **any two** of the following : **6**

   1) Write a short note on colour of milk.

   2) What precautions should be taken at the time of receiving milk ?

   3) Classify cream. Give its food, nutritive value.

   b) Answer **any two**. **4**

   1) Give food and nutritive value and uses of whey powder.

   2) What is sterilisation of milk ?

   3) Give flowsheet diagram for manufacture of cheese powder.

3. A) Write an essay on milk vitamins. **5**

   OR

   A) Define market milk. State constituents of milk. Explain the factors affecting composition of milk.

   B) Give principle, advantages and disadvantages of water-dilution method of cream separation. **5**

   OR

   B) Draw flowsheet diagram of manufacture of flavoured milk. Define flavoured milk. What precautions should be taken while selecting the fruits and essences/ flavours for preparing flavoured milk ?

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

1) Explain the term ‘Homogenisation of milk’. Give its flowsheet diagram.

2) Write short note on ascorbic acid (vitamin-C) in milk.

3) How will you test the presence of β-naphthol and salicylic acid in milk sample.

b) Answer **any two**. **4**

1) Give flowsheet diagram for manufacture of ‘Shrikhand powder’.

2) Define ‘cheese powder’. Give its uses.

3) What do you understand by standardisation of cream.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY
Paper – I : BO-341 : Plant Physiology and Biochemistry
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B : *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 photophosphorylation ?
   b) Define aerobic respiration.
   c) What is translocation of organic solutes ?
   d) Define biotic stresses.
   e) Mention types of seed dormancy.
   f) What is free energy ?
   g) Give any two factors affecting enzyme activity.
   h) Define oligosaccharides.
   i) Give any two functions of lipids.
   j) What are enzymes ?

2. Attempt **any two** of the following : **10**
   a) Give an outline of calvin cycle and give its significance.
   b) Explain source and sink relationship.
   c) Give properties of lipids.

3. Write notes on (**any two**) : **10**
   a) HSK pathway
   b) Polysaccharides
   c) Properties of enzymes.

4. Describe an ultra-structure of a mitochondrion. Give functions of it. **10**

   OR

   Define proteins. Give properties and functions of proteins. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY (Paper – II)
BO-342 : Plant Pathology (New)
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

2) Neat labelled diagrams must be drawn ***wherever*** *necessary.*

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

1. Answer the following : **10**

a) Define pathogen.

b) What is inoculum ?

c) Give the name of causal organism of root knot disease of vegetables.

d) What is biochemical defence mechanism ?

e) Define disease forecasting.

f) What is epidemiology ?

g) Cite the name of any two diseases caused by bacteria.

h) Define IPM.

i) What is quarantine ?

j) Give any two control measures for mycoplasma diseases.

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

a) Give the contribution of Anton Bary with respect to plant pathology.

b) Explain the role of bacteria as plant pathogens.

c) Give an account of Downy Mildew of grapes.

P.T.O.

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

   a) Methods of pure culture.

   b) Economic importance of plant diseases.

   c) Biological control.

4. What is disease cycle ? Describe plant disease development in detail. **10**

   OR

   Give an account of head smut of jowar and tobacco Mosaic disease with reference to causal organism, symptoms and control measures. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY (New Course)
Paper – IV : BO.344 : Plant Biotechnology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 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 are edible antibodies ?

   b) Define Biotechnology.

   c) Enlist any two enzymes used in gene cloning.

   d) What is NCBI ?

   e) Define Genetic Engineering.

   f) Enlist any two bacteria used in non-symbiotic nitrogen fixation.

   g) What is BLAST ?

   h) Define Nod gene.

   i) What are somatic hybrids ?

   j) Define gene therapy.

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

   a) Explain the mechanism of symbiotic nitrogen fixation.

   b) Describe various functions of Gene conservation banks.

   c) Give the importance of “Human Genome Project”.

P.T.O.

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

   a) Importance of Biotechnology in plant Biodiversity conservation.

   b) Resources available from NCBI and their uses.

   c) Characterization and applications of Mycorrhiza as Biofertilizer.

4. Define PAGF. Briefly explain its procedure. Add a note on its applications. **10**

   OR

   Describe various molecular tools used in Genetic Engineering. Add a note on its applications. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BOTANY
Paper – V : BO-345 : Botanical Techniques
(New) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: 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 the range of wavelength of UV rays ?

b) How many total divisions are in stage micrometer ?

c) What is amplitude ?

d) Enlist two advantages of paper chromatography.

e) What is role of acetic acid in acetocarmine ?

f) Give any two advantages of digital camera.

g) What is partition coefficient ?

h) Define micrometry.

i) Define pH.

j) Give uses of camera lucida.

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

a) Explain principle and working of centrifuge.

b) Draw, label and describe ray diagram of dissecting microscope.

c) Describe the concept of X-ray micro analysis.

P.T.O.

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

   a) Tilak air sampler.

   b) Isotopes and radioactivity.

   c) Beer and Lambert's law.

4. What is microtomy ? Describe the technique of killing, fixation, dehydration and mounting of ribbon on slide. **(10)**

   OR

4. Describe resolution phenomenon and resolving power of compound microscope. Add a note on magnification. **(10)**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – I)
ZY-341 : Biotechnology (New)
(2008 Pattern)

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 biotechnology ?

2) Define tissue culture.

3) What is PCR ?

4) What is inoculum ?

5) Define cloning.

6) What is northern blotting ?

7) Define totipotency.

8) Give the significance of Bacillus thuringiensis.

9) Define cell line.

10) Define nanotechnology.

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

i) Describe aquaporin structure.

ii) Describe various types of stem cells and their applications.

iii) Write advantages and disadvantages of animal tissue culture.

P.T.O.

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

   a) Monoclonal antibody.

   b) Characteristics and importance of a clonal vector.

   c) Somatic cell fusion.

   d) Riboflavin production by fermentation technology.

4. Describe microbial and antimicrobial biopesticides. Add a note on the advantages of biopesticides. **10**

   OR

   What is cell, tissue and organ cultures ? Describe in brief the necessary laboratory facilities required for tissue culture. **10**

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[4017] – 432

T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – II) (2008 Pattern)
ZY – 342 : Mammalian Physiology and Endocrinology
(New)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

1) What is arterial hypoxia ?

2) What is heart attack ?

3) What is ultrafiltration ?

4) Define endocrine gland.

5) What is synapse ?

6) What is pregnancy ?

7) What is muscle fatigue ?

8) What is lactation ?

9) Name any two hormones of Pituitary gland.

10) Define glycolysis.

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

i) Explain the process and significance of transamination.

ii) Describe various phases of oestrous cycle.

iii) Describe transport of oxygen from lungs to tissues.

P.T.O.

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

   a) Beta oxidation of fatty acid.

   b) Physiology of thyroid gland.

   c) Rigor mortis.

   d) Selective reabsorption.

4. What is cardiac cycle ? Describe various phases of cardiac cycle and add a note on cardiac sounds. **10**

   OR

4. Describe in detail generation and conduction of nerve impulse in a non-myelinated nerve fiber. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – III) (2008 Pattern)
ZY – 343 : Molecular Biology
(New)

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 complementary base pairing ?
   2) What is hyperchromic effect ?
   3) Define intron.
   4) State any two features of Z-DNA.
   5) Define plasmid.
   6) What is 'Base Excision Repair' ?
   7) Which bacteria were used by Griffith in experiment on bacterial transformation ?
   8) Mention the genetic material of human immuno deficiency virus.
   9) Give the role of rho-factor in transcription.
   10) Name the inducer of lac operon.

2. Attempt **any two** of the following : **10**
   i) Explain in brief Trp. operon.
   ii) Explain the mechanism of DNA damage by any two chemical agents.
   iii) Explain the mechanism of elongation of translation.

3. Write notes on **any two** of the following : **10**
   a) mRNA
   b) Eukaryotic chromatin structure
   c) Genetic code and its deciphering
   d) Initiation of transcription.

4. Explain the mechanism of DNA replication in prokaryotes. **10**

OR

4. Explain Zinder and Lederberg experiment on transduction. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ZOOLOGY (Paper – VI)
ZY – 346 : Genetics and Developmental Biology
(2008 Pattern) (New)

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 gametic mutation ?

   2) What is alecithal egg ?

   3) Define heterozygons condition.

   4) Define organogenesis.

   5) Define spermiogenesis.

   6) Define gastrula.

   7) Explain Hensen's node.

   8) Explain out breeding.

   9) Define muton.

   10) What is Euthenics ?

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

   1) Explain the process of apopotosis.

   2) Explain the significance of Hardy-Weinberg equilibrium in population biology.

   3) Explain the process of regeneration in planneria.

P.T.O.

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

   i) Fate map of frog blastula

   ii) DNA polymarase

   iii) Cytoplasmic inheritance

   iv) Transgenic mice.

4. Explain the process of gene cloning. Add a note on use of restriction enzymes. **10**

   OR

   What is external fertilization ? Explain process of fertilization with reference to seaurchin. **10**

[4017] – 437

T. Y. B. Sc. (Semester – IV) Examination, 2011
GL 341 : GEOLOGY (Paper – I)
Metamorphic Petrology (New)
(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/define/explain the following in **2/3** lines. **10**

   a) What is 'schistosity' ?

   b) State the lower limits of metamorphism.

   c) Name any two minerals and rocks formed during regional metamorphism.

   d) State the different depth zones of regional metamorphism.

   e) Name the factors that control the thermal metamorphism.

   f) What is burial metamorphism ?

   g) What is a 'Mosaic' structure ?

   h) Define the term 'mylonite'.

   i) What is a lineation ?

   j) Name any two minerals developed during pneumatolysis.

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

   a) Characteristics of crystal growth in the solid state during metamorphic processes.

   b) Diagnostic structures of thermally metamorphosed rocks.

   c) Chlorite and biotite zones of Barrovian zones.

P.T.O.

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

   a) Effects of regional metamorphism on calcareous sediments.

   b) Stress and solubility of minerals.

   c) Isograde.

4. What is a regional metamorphism ? Describe the effects of regional metamorphism on argillaceous sediments ? **10**

   OR

   Define and explain general characteristics of plutonic metamorphism and write a note on eclogite.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOLOGY (Paper – II)
(2008 Pattern) (New)
GL – 342 : Environmental Geology

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. Define / explain / answer the following in **2/3** lines.

   a) Name any four biogeochemical cycles.

   b) What are "decomposers", give examples.

   c) Give the causes of bad land topography.

   d) Name few mitigation measures during an earthquake.

   e) Give few causes of floods.

   f) What are avalanches ?

   g) Where the ozone layer is found ?

   h) Greenhouse effect.

   i) Conventional and nonconventional sources of energy.

   j) Give causes of ozone layer depletion. **10**

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

   a) Risk reduction measures for coastal erosion.

   b) Causes of desertification.

   c) Bhopal gas disaster. **10**

P.T.O.

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

   a) Explain the causes of soil pollution.

   b) Explain the hazardous effects of volcanic eruption.

   c) Write a note on solar and tidal energy. **10**

4. What is meant by air pollution ? Explain in detail sources and classification of air pollution.

   OR

4. What are landslides ? Describe different measures used to control landslides. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOLOGY (Paper – V)
GL 345 : Phanerozoic Stratigraphy of India and Palaeontology
(New) (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.

   a) Name any two Index Fossils of Cambrian System.

   b) Give tripartite classification of Gondwana Super group.

   c) Give systematic classification of Ptillophylum.

   d) What are 'Inter-trappeans' ?

   e) How are laterites classified ?

   f) Give type area of Permian System.

   g) Define fore deeps.

   h) Name the marine intercalations in Lower Gondwanas.

   i) Name the formations of Jurassic of Kutch.

   j) Name the formations of Carboniferous of Spiti. **10**

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

   a) Infratrappeans.

   b) Climatic conditions during Gondwana Supergroup.

   c) Classification of Siwalik System. **10**

P.T.O.

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

   a) Cretaceous of Cauvery Basin.

   b) Mass extinction at K-T boundary.

   c) Systematic classification, characteristics and distribution of any one Gondwana Plant Fossil. **10**

4. Give a detailed account of morphology, classification and distribution of Graptolites.

   OR

   Explain at length the type area, broad lithology, fossil content and classification of Carboniferous System. **10**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOLOGY (Paper – VI)
GL - 346 : Applied Geology – II
(Engineering Geology, Geohydrology and Prospecting)
(2008 Pattern) (New)

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 rail road ballast.

b) State any two qualities of good facing stone.

c) Give any two important tunnels in India.

d) What are highway aggregates ?

e) What is meant by aquiclude ?

f) What is juvenile water ?

g) Define aquifuge.

h) What is water table ?

i) What is Torsion balance.

h) What is Worden gravimeter ?

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

a) Role of ground water in tunneling.

b) Importance of structural geology as applied to civil engineering.

c) Occurrence of groundwater.

P.T.O.

3. Write short notes (**any two**)**:** **10**

   a) Residual stress and shear stress.

   b) Tunneling in Deccan traps.

   c) Rain water harvesting.

4. Explain principle and application of resistivity method of geophysical prospecting. **10**

OR

4. a) Explain permeability with reference to ground water flow. **5**

   b) Explain compressive strength of rock. **5**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – I)
ST-341 : Distribution Theory – II
(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 alternative : **(1 each)**

i) Let X~C (0, 1) then X also follows a t- distribution with degrees of freedom :

A) 2 B) 1 C) 0 D) 3

ii) If X ~L (μ = 1, λ=2), then third quartile of X is

A) $1+\frac{l\text{n}2}{2}$ B) $1-\frac{l\text{n}2}{2}$ C) $2-\frac{l\text{n}2}{2}$ D) $l\text{n}\ 2$

iii) For BN (1, 1, 1, 1, 0.5) distribution, correlation coefficient between 2X and –3Y is

A) 1 B) 0.5 C) –0.5 D) 0

iv) If $X \sim LN\left(0, \mu, \sigma^2\right)$, then Mode of X is

A) e^{μ} B) $e^{\mu-\sigma^2}$ C) e^{σ^2} D) $e^{\mu+\sigma^2}$

b) In each of the following cases, state whether the given statement is **true** or **false** : **(1 each)**

i) For a truncated Poisson distribution, truncated at X = 0 with parameter 'm', mean is less than 'm'.

ii) For a Stochastic matrix row sums are always equal to 1.

P.T.O.

c) Define each of the following : **(1 each)**

i) Finite Markov chain.

ii) n-step transition probabilities.

d) i) State Chapman-Kolmogorov equation. **1**

ii) What is the state space of a Finite Markov chain ? **1**

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

a) Let $X \sim C(\mu, \lambda)$. Obtain the distribution function and hence find first and third quartiles. Also find its quartile deviation.

b) Obtain moment generating function and cumulant generating function of $L(\mu, \lambda)$. Also find its coefficient of skewness β_1 and comment.

c) Let $X \sim LN(a, \mu, \sigma^2)$. Obtain r^{th} moment about X= a, hence find its variance.

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

a) Let X~B (n, p) truncated at X = 0. State the p.m.f. of the resulting distribution and find its mean and variance.

b) Let $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$. Obtain the conditional distribution of X given Y = y.

c) State and prove the relationship between $LN(a, \mu, \sigma^2)$ distribution and $N(\mu, \sigma^2)$ distribution.

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

a) i) Let $X \sim N(\mu, \sigma^2)$ which is truncated to the left at x =a, where 'a' is a real number. Obtain the p.d.f. and mean of the resulting truncated distribution. **6**

ii) Determine the parameters for the following bivariate normal distribution. **4**

$$f(x,y) = C \exp\left[-\frac{2}{3} \left\{ \frac{(x-7)^2}{9} - \frac{(x-7)(y-5)}{6} + \frac{(y-5)^2}{4} \right\} \right]$$

b) i) Let $\{ X_n, n \geq 0 \}$ be a Markov-chain with initial probability distribution $\pi = \{ 1/3, 1/3, 1/3 \}$. The one-step transition probability matrix is given by

$$P = \begin{bmatrix} 1/3 & 2/3 & 0 \\ 2/3 & 1/6 & 1/6 \\ 1/6 & 1/3 & 1/2 \end{bmatrix}$$

Find : **6**

I) $P[X_2 = 1,\ X_1 = 2, X_0 = 1]$

II) $P[X_1 = 0 | X_0 = 1]$

III) $P[X_{12} = 2 | X_{10} = 1]$

ii) Let $X \sim L(\mu = 1, \lambda = 4)$.

Find : **4**

I) $P[|X| < 2]$

II) $P[-1 < X < 2]$

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal)
Paper – II : ST – 342 : Testing of Hypotheses
(2008 Pattern) (New Course)

Time : 2 Hours Total 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.*

Attempt **each** of the following :

1. a) In **each** of the following cases, choose the correct alternative : **(1 each)**

i) Power of a test is the probability of

A) Rejecting H_0 when it is true

B) Accepting H_0 when H_1 is true

C) Rejecting H_0 when H_1 is true

D) Accepting H_0 when H_0 is true

ii) In case of $N(\mu, \delta^2)$, δ^2 known, the UMP critical region for testing

$H_0 : \mu = \mu_0$ against $H_1 : \mu < \mu_0$ is of the form :

A) $\overline{X} < k$ B) $\overline{X} > k$

C) $\sum Xi^2 < k$ D) $\sum Xi^2 > k$

P.T.O.

iii) For carrying out SPRT, the following should be fixed in advance :

A) Probability of type I error
B) Probability of type II error
C) Size of the sample
D) Probabilities of type I and type II errors

iv) For testing the goodness of fit of a distribution following test is used :

A) Run test
B) Kolmogorov -Smirnov test
C) Sign test
D) Mann - Whitney test

b) In **each** of the following cases, state whether the given statement is **true** or **false** : **(1 each)**

i) LRT can be used to test a simple null hypothesis against a simple alternative hypothesis.

ii) The stopping bounds of SPRT of strength (α, β) are given by $A = \frac{1-\beta}{\alpha}$ and $B = \frac{\beta}{1-\alpha}$.

c) Define **each** of the following : **(1 each)**

i) Level of significance

ii) Uniformly most powerful critical region

d) Explain **each** of the following : **(1 each)**

i) LRT

ii) MP level α test.

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

a) Let $X_1, X_2 .. X_n$ be a r.s. from a Poisson distribution with mean λ. Find BCR of size α for testing $H_0 : \lambda = \lambda_0$ against $H_1 : \lambda = \lambda_1 (\lambda_1 > \lambda_0)$.

b) Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against

$H_1 : \theta = \theta_1 (\theta_1 > \theta_0)$ for a Bernoulli distribution with parameter θ.

c) Calculate the power of the test if $\alpha = 0.10$ and best test is employed for testing $H_0 : \mu = 10$ against $H_1 : \mu = 11$ for a normal variable with $\delta = 1$ and a r.s. of 25 observations is used.

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

a) Describe Mann- Whitney U test for two samples.

b) Construct LRT of level of significance α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$; where μ is the mean of $N(\mu, \delta^2)$ when δ^2 is known.

c) Median weight of a sample of a particular species of monkey from a certain locality was 8.41 kg. A r.s. of 16 monkeys of the same species from another locality gives the weights as (in kgs) :

8.3, 9.5, 9.6, 8.75, 9.1, 8.4, 9.25, 9.8, 10.05, 8.15, 10.0, 9.0, 9.6, 9.8, 9.2, 9.3.

Can we conclude that the median weight of the population from which the second r.s. was drawn is greater than 8.41 kg, at 5% l.o.s.

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

a) i) A random variable X follows binomial distribution with parameters $n = 10$ and p. Construct a UMP level α test for testing $H_0: p = 0.4$ against $H_1 : p > 0.4$ based on a single observation. **(5)**

ii) Let X be a random variable with p. m. f. f_0 under H_0 and f_1 under H_1 as given below :

X	1	2	3	4
f_0	0.1	0.2	0.3	0.4
f_1	0.4	0.3	0.2	0.1

Find all critical regions for which probability of type I error is ≤ 0.4. Which among them has maximum power ? **(5)**

b) i) Construct SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (\theta_1 < \theta_0)$ for a normal distribution with parameters (θ, δ^2), when δ^2 is known. **(5)**

ii) Describe Kolmogorov- Smirnov test for completely specified univariate distribution based on a single sample. **(5)**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – III)
ST-343 : Statistical Process Control (Offline Methods)
(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. Attempt **each** of the following.

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

i) The structure function $\Phi(\underline{x})$ of a series system is

A) $\coprod x_i$ B) $\prod_i x_i$

C) $1- x_i$ D) $1- \prod_i (1-x_i)$

ii) In a single sampling plan, the expression for AOQ is given by

A) AOQ=[(n–N)/N].p.Pa B) AOQ=[N/N–n)].p.Pa

C) AOQ=[(N–n)/N].p.Pa D) AOQ=[Nn/(N–n)]p.Pa

iii) If the life length T of a component is exponential with mean λ then its hazard rate is

A) λ B) $\frac{1}{\lambda}$

C) $\exp(-\lambda t)$ D) $1- \exp(-\lambda t)$

iv) Producer's risk is probability of rejecting a lot of quality of equal to

A) AOQ B) AQL C) AOQL D) LTPD

b) In **each** of the following cases, state whether the given statement is **true** or **false** : **(1 each)**

i) A coherent system can have irrelevant components.

ii) In a single sampling plan, the exact sampling distribution of the number of defectives in a sample is Hypergeometric.

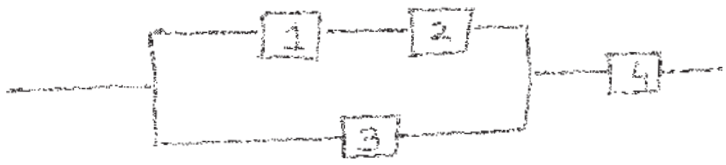
P.T.O.

c) Define the following terms. **(1 each)**

i) Lot Tolerance Percent Defective (LTPD)

ii) IFRA distribution.

d) i) Draw the fault tree diagram for the following Reliability Block Diagram.



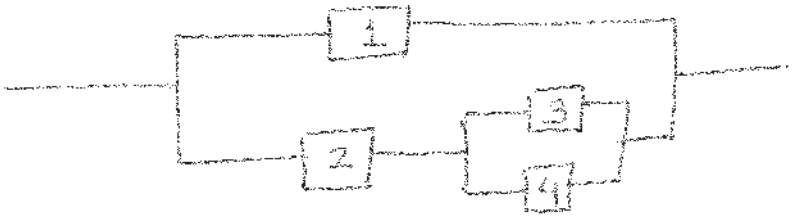
1

ii) Explain the procedure of single sampling plan. **1**

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

a) For a single sampling plan N=1000, n=100, c=3, compute ATI and AOQ if the lot fraction defective is 0.02.

b) Obtain the structure function and all minimal path sets for the system represented by following Reliability Block diagram.



c) Obtain the hazard rate of a life time (T) which follows Weibull distribution. Discuss its behavior.

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

a) Define reliability of a coherent system of n components. Derive the expression for system reliability of 2 out of 3 : G system.

b) Derive the expression for ATI in case of double sampling plan.

c) Two tubes in a radio set function independently. The tubes are assembled in parallel. What is the probability that the assembly will not fail before first two months if life length in years of each tube is a r.v.T with p.d.f. $f(t)=25\ \exp(-25t),\ t \geq 0$.

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

a) i) If $r_i(t)$ i=1, 2, . . . , n are hazard rates of n independent components of a series system then prove that the hazard rate of the system $r(t) = \sum_{i=1}^{n} r_i(t)$. **4**

ii) Compute consumer's risk for a single sampling plan with N=1000, n=50, c=3 and LTPD=0.05 **3**

iii) Explain : Normal , reduced and tightened sampling. **3**

b) i) Discuss the importance of exponential distribution in Reliability Theory. **3**

ii) For a double sampling plan N=4000, n_1=50, c_1=0, n_2=100, c_2=3 compute ASN if the lot is of quality 0.03. **4**

iii) Write a note on ISO. **3**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – IV)
ST-344 : Sampling Methods
(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*** *meaning.*

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

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

i) In SRSWOR, the probability that a particular random sample of size n is selected from a population of size N is

A) $\frac{1}{\binom{N}{n}}$ B) $\frac{1}{NP_n}$

C) $\frac{1}{N}$ D) $\frac{1}{n}$

ii) In stratified random sampling with k strata, the size of the subsample from i^{th} stratum using Neyman allocation is

A) $n_i = nW_i$ B) $n_i = nW_iS_i$

C) $n_i = n\frac{W_iS_i}{\sum W_iS_i}$ D) $n_i = \frac{W_iS_i}{\sum W_iS_i}$

iii) With usual notation, the ratio estimator of the population mean $\overline{Y}_N$ is

A) $R_N\overline{X}_N$ B) $R_N\overline{y}_N$

C) $R_n\overline{X}_N$ D) $R_n.X$

iv) Hansen and Hurwitz technique is used for the analysis of

A) response B) non-response

C) sampling error D) non-sampling error

P.T.O.

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

i) In SRSWOR, sample mean square is an unbiased estimator of population variance.

ii) Regression estimator of the population mean is always its unbiased estimator.

c) Explain the following terms : **(1 each)**

i) sampling unit,

ii) proportional allocation.

d) i) State any two demerits of systematic sampling. **1**

ii) Write an expression for the sample size under SRSWOR for a continuous characteristic, given margin of error = d and confidence coefficient = $1 - \alpha$. **1**

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

a) In case of SRSWR, derive an expression for the standard error of an unbiased estimator of the population mean.

b) Explain the procedure of systematic sampling. Obtain an unbiased estimator of the population mean under systematic sampling and compare its efficiency with that of SRSWOR.

c) State the requirements of a good questionnaire.

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

a) In case of stratified random sampling the cost function is $C = C_o + \sum_{i=1}^{k} C_i n_i$ where C_o and C_i are known constants. Show that variance of unbiased estimator of the population mean is minimum for the fixed total cost if $n_i \alpha \frac{N_i S_i}{\sqrt{C_i}}$.

b) Define ratio and regression estimators of the population mean. Also state the expressions for their variances and compare them.

c) Explain the practical problems arising at the planning stage of a sample survey.

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

a) i) What is the need of stratified random sampling ? Suggest an unbiased estimator of the population mean under stratified random sampling and derive an expression for its standard error. **6**

ii) The units of a population are classified into two classes C and C'. With usual notation, determine the size of a sample in case of SRSWOR such that $P[1p - \underline{P}| \geq d] = \alpha$ where d = 0.05, α = 0.05, N = 1000, p = 0.5. **4**

b) i) Prove that $var(\bar{y}_{st})_{PA} \leq var(\bar{y})_{SRSWOR}$ (ignore f.p.c.). **5**

ii) For a population with linear trend, prove that $var(\bar{y}_{st}) : var(\bar{y}_{sy}) : var(\bar{y})_{SRSWOR}$ is $1 : n : n^2$ if the population size N is very large. **5**

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B/II/11/150

[4017] – 447

T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – V)
ST-345 : Operations Research
(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) Choose the correct alternative in **each** of the following : **(1 each)**

i) In the standard form of LPP, all constraints are expressed as

A) Strict inequality of < type

B) Strict inequality of > type

C) Greater than or equal to type

D) Equations

ii) If an assignment problem, decision variables can take values

A) either 1 or 2 B) either 0 or 1

C) either – 1 or 1 D) either – 1 or 0

iii) If objective function in LPP is of minimization type, then a unique optimum solution is reached when all

A) $c_j - z_j \geq 0$ B) $c_j - z_j \leq 0$

C) $c_j - z_j < 0$ D) $c_j - z_j > 0$

iv) If primal problem has an infeasible solution then solution of the dual problem is

A) unbounded B) feasible

C) infeasible D) degenerate

P.T.O.

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

i) Simulation model does not generate solution by itself but only generates a way of evaluating solutions.

ii) Unbalanced assignment problem can be solved using Hungarian method of assignment.

c) Define **each** of the following terms : **(1 each)**

i) a degenerate solution of transportation problem (T.P.)

ii) an artificial variable.

d) i) What do you mean by an optimum sequence in sequencing problem ? **1**

ii) State the canonical form of LPP. **1**

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

a) i) Give the mathematical formulation of T.P. **2**

ii) What do you mean by an unbalanced T.P ? Explain how to convert the unbalanced TP into a balanced one. **3**

b) Five jobs are performed, first on machine X and then on machine Y. The time taken, in hours by each job on each machine is given below :

Job	:	**A**	**B**	**C**	**D**	**E**
Machine X	:	12	4	20	14	22
Machine Y	:	6	14	16	18	10

Determine a sequence of five jobs that will minimize the total elapsed time.

Obtain idle time for each machine. **5**

c) A company sells two different products A and B. The two products are produced in a common production process and are sold in two different markets. The production process has a total capacity of 45,000 man-hours. It takes 5 hours to produce a unit of A and 3 hours to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 7,000 and that of B is 10,000. The profit is Rs. 600 per unit for the product A and Rs. 400 per unit for the product B.

Formulate the problem as a linear programming problem. **5**

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

a) What are pseudo random numbers ? Explain linear congruential generator. Generate five pseudo random numbers using it.

b) Solve the following assignment problem. The figures represent time required (in minutes) to complete the job. Does it have multiple solutions ? If yes, identify them.

	Job			
Worker	**A**	**B**	**C**	**D**
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

c) Write the dual of the following LPP :

Minimize $Z = 2x_1 + 3x_2 + 4x_3$

Subject to the constraints

$2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 = 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1, x_2 \geq 0$ and x_3 is unrestricted in sign.

4. Attempt **any one** of the following : **(10 each)**

a) Solve the following LPP by simplex method :

Maximize $Z = 800x_1 + 600x_2 + 300x_3$

Subject to the constraints

$10x_1 + 4x_2 + 5x_3 \leq 2000$

$2x_1 + 5x_2 + 4x_3 \leq 1009$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0.$

b) Find the optimal solution to the following TP by obtaining initial basic feasible solution using VAM.

	Destination				
Source	**P**	**Q**	**R**	**S**	**Supply**
A	21	16	25	13	11
B	17	18	14	23	13
C	32	17	18	41	19
Demand	6	10	12	15	43

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – V)
ST-345 : Operations Research
(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) Choose the correct alternative in **each** of the following : **(1 each)**

i) In the standard form of LPP, all constraints are expressed as

A) Strict inequality of < type

B) Strict inequality of > type

C) Greater than or equal to type

D) Equations

ii) If an assignment problem, decision variables can take values

A) either 1 or 2 B) either 0 or 1

C) either – 1 or 1 D) either – 1 or 0

iii) If objective function in LPP is of minimization type, then a unique optimum solution is reached when all

A) $c_j - z_j \geq 0$ B) $c_j - z_j \leq 0$

C) $c_j - z_j < 0$ D) $c_j - z_j > 0$

iv) If primal problem has an infeasible solution then solution of the dual problem is

A) unbounded B) feasible

C) infeasible D) degenerate

P.T.O.

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

i) Simulation model does not generate solution by itself but only generates a way of evaluating solutions.

ii) Unbalanced assignment problem can be solved using Hungarian method of assignment.

c) Define **each** of the following terms : **(1 each)**

i) a degenerate solution of transportation problem (T.P.)

ii) an artificial variable.

d) i) What do you mean by an optimum sequence in sequencing problem ? **1**

ii) State the canonical form of LPP. **1**

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

a) i) Give the mathematical formulation of T.P. **2**

ii) What do you mean by an unbalanced T.P ? Explain how to convert the unbalanced TP into a balanced one. **3**

b) Five jobs are performed, first on machine X and then on machine Y. The time taken, in hours by each job on each machine is given below :

Job	:	**A**	**B**	**C**	**D**	**E**
Machine X	:	12	4	20	14	22
Machine Y	:	6	14	16	18	10

Determine a sequence of five jobs that will minimize the total elapsed time.

Obtain idle time for each machine. **5**

c) A company sells two different products A and B. The two products are produced in a common production process and are sold in two different markets. The production process has a total capacity of 45,000 man-hours. It takes 5 hours to produce a unit of A and 3 hours to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 7,000 and that of B is 10,000. The profit is Rs. 600 per unit for the product A and Rs. 400 per unit for the product B.

Formulate the problem as a linear programming problem. **5**

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

a) What are pseudo random numbers ? Explain linear congruential generator. Generate five pseudo random numbers using it.

b) Solve the following assignment problem. The figures represent time required (in minutes) to complete the job. Does it have multiple solutions ? If yes, identify them.

	Job			
Worker	**A**	**B**	**C**	**D**
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

c) Write the dual of the following LPP :

Minimize $Z = 2x_1 + 3x_2 + 4x_3$

Subject to the constraints

$2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 = 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1, x_2 \geq 0$ and x_3 is unrestricted in sign.

4. Attempt **any one** of the following : **(10 each)**

a) Solve the following LPP by simplex method :

Maximize $Z = 800x_1 + 600x_2 + 300x_3$

Subject to the constraints

$10x_1 + 4x_2 + 5x_3 \leq 2000$

$2x_1 + 5x_2 + 4x_3 \leq 1009$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0.$

b) Find the optimal solution to the following TP by obtaining initial basic feasible solution using VAM.

	Destination				
Source	**P**	**Q**	**R**	**S**	**Supply**
A	21	16	25	13	11
B	17	18	14	23	13
C	32	17	18	41	19
Demand	6	10	12	15	43

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS : (Principal) (Paper – VI)
ST - 346 (C) : Statistical Computing using R Software
(2008 Pattern) (New Course)
(Batch No. – 1) (On Line Paper)

Time : 2 Hours Max. Marks : 40

Instructions : *1) **All** questions are **compulsory.***
*2) Figures to the **right** indicate **full** marks.*
3) Each question is to be solved using R Software installed on your computer.
4) Attach computer printout of your work to the answerbook supplied to you.

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

   a) A vector x contains elements 6, 3, 8, 10, 11, 9, 5, 10, 2, 13. Create a vector y from x containing elements of x which are greater than 10.

   b) Find mode and median of following twelve observations :

   3, 8, 10, 15, 20, 7, 2, 5, 8, 3, 4, 3.

   c) Access data 'cars' from resident data sets and find its summary statistics.

   d) Draw a box plot of following observations :

   14, 11, 10, 5, 3, 16, 26, 34, 31,17, 22, 28, 20, 22.

   e) Draw a simple random sample of size 6 from a population of 30 units using SRSWOR.

   f) Simulate an experiment of tossing a die 80 times and prepare its frequency distribution.

   g) Let $X \sim B(n=10, p=0.4)$

   Find $P[X \leq 4]$ and $P[X > 7]$.

   h) Draw a rod plot of following data :

x	2	4	6	8	10
f	6	12	23	17	2

P.T.O.

i) Create a data frame of roll number and marks obtained by 8 students.

j) Draw a random sample of size 8 from Poisson distribution with mean 2.4.

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

a) Data on defects found in manufacturing of spiral spring for a week are as follows :

Defective Characteristics	**Frequency**
Tensile strength	40
Length	20
Inner diameter	26
Outer diameter	27
Ovality and eccentricity	28
Distortion due to heating	17
Diameter of Coil	10

Draw a Pie diagram for the above data.

b) Height of 200 students of a senior college is recorded as follows :

Height (in cm)	**No. of Students**
145-150	02
150-155	06
155-160	30
160-165	60
165-170	62
170-175	30
175-180	07
180-185	03

Calculate Bowley's coefficient of skewness.

c) Fit a second degree parabola to the following data :

Year (X)	2004	2005	2006	2007	2008	2009
Profit (Y) (in '000 Rs.)	23	26	31	37	44	19

Also estimate Y for each given X.

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

a) In the course of an experiment, seven cockroaches were put in each of 118 jars and subjected to doses of a spray. After 4 hours the number of dead cockroaches in each jar was counted and the following frequency distribution was obtained :

No. of cockroaches dead	0	1	2	3	4	5	6	7
No. of jars	2	12	14	22	28	17	13	10

Fit a bionomial distribution to the above data and comment on the adequacy of model.

b) An I.Q. test was administered to 6 candidates before and after they were trained. The results are given below :

Candidate:	1	2	3	4	5	6
I.Q. before training :	111	124	132	121	118	119
I.Q. after training :	121	120	136	123	120	117

Test whether the training is effective. Use $\alpha = 0.05$.

c) A certain brand of tyre has the following frequency distribution for its life (in thousand kms) :

Life :	15-20	20-25	25-30	30-35	35-40	40-45
No. of tyres :	5	9	14	21	15	6

Draw less than and more than ogive curve.

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

a) i) Following are data on three variables X_1, X_2 and X_3.

$\mathbf{X_1}$	76	54	39	41	98	38	41
$\mathbf{X_2}$	58	60	72	39	47	52	65
$\mathbf{X_3}$	5	7	10	3	6	7	13

Obtain equation of regression plane of X_1 on X_2 and X_3. Also find multiple correlation coefficient $R_{1.23}$. **5**

ii) A random sample of 7 boys had the following Intelligent quotients (I.Q) : 101, 88, 83, 97, 89, 107, 124.
Do these data support the assumption that the population mean I.Q. is 102 ?
Use $\alpha = 0.05$. **5**

b) i) A die is tossed 126 times and the following results are obtained :

Number turned up :	1	2	3	4	5	6
Frequency :	31	26	19	11	23	16

Test the hypothesis that the die is unbiased. **4**

ii) Three processors A, B and C are tested to see whether their outputs are equivalent. The following observations of output are obtained :

A	12	8	17	14	13	10	11
B	13	16	15	12	9		
C	9	10	18	17	16	12	

Carry out the analysis of variance. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – VI)
ST – 346 (A) : Medical 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 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 alternative :

i) Epidemiology is the study which applies only to

A) zoological populations

B) human populations

C) plant populations

D) bird populations

ii) In which phase the drug is introduced in selected patients with the disease which it is intended.

A) phase I study

B) phase II study

C) phase IV study

D) phase III study

iii) The logistic growth equation is called sigmoidal because it is shaped like letter

A) V B) Z C) S D) σ

P.T.O.

iv) For paired data in testing hypothesis required sample size is given by **(1 each)**

A) $\frac{(Z_{1-\alpha} - Z_{\beta})^2 \sigma d^2}{\delta^2 d}$

B) $\frac{2(Z_{1-\alpha} - Z_{\beta})^2 \sigma d^2}{\delta^2 d}$

C) $\frac{(Z_{1-\alpha} - Z_{\beta})^2 \sigma d}{\delta d}$

D) $\frac{2(Z_{1-\alpha} - Z_{\beta})^2 \sigma d}{\delta d}$

b) In each of the following cases, state whether the given statement is **true** or **false** :

i) "Correlation does not imply causation" is a common theme for much of the epidemiological literature.

ii) $\frac{d}{dt}N(t)$ is symmetric around $\frac{K}{2}$. **(1 each)**

c) Define the following terms :

i) Washout period

ii) 80/20 rule for assessment of bioequivalance. **(1 each)**

d) i) State any two properties of survival function.

ii) State the exponential growth model. **(1 each)**

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

a) Explain the concept of Precision and bias from Epidemiology.

b) What are the advantages and disadvantages of blinding used in clinical trials ?

c) A survival model is defined by the following values of P_x for a radix of 10,000.

Time Units (X)	0	1	2	3	4	5	6
Survival Probability (P_x)	0.98	0.8	0.6	0.5	0.3	0.15	0

Prepare cohort life table containing columns S(x), l_x, L_x and T_x. What is limiting age ? **(5 each)**

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

a) Discuss the importance of epidemiology giving two illustrations.

b) Write short note on 'Crossover design' used in clinical trials.

c) Given below are caffeine concentration values after taking a dose. Estimate

C_{max}, T_{max}. Also calculate $A \cup C_{(0, 180)}$. **(5 each)**

Time (in minutes)	10	30	60	90	120	180
Concentration (microgram/m_1)	4	3	1	0.75	0.55	0.3

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

a) i) Discuss the role of FDA. **3**

ii) Suppose μ_C and μ_T denote the mean responses of two formulations control (C) and test (T) with unknown variance. Explain how you test $H_0 : \mu_T = \mu_C$ against $H_1 : \mu_T > \mu_C$.

Assuming equal sample sizes for both the test groups, find the expression of sample size of each group to get power $1 - \beta$. **4**

iii) Explain, in brief, the role of placebo in clinical trials. **3**

b) i) Derive the equation for sigmoidal growth. **5**

ii) The following is 2×2 contengency table for risk of a heart attack and medicine given :

Riks of heart attack / **Medicine**	Yes	No
Aspirin	100	10,000
Placebo	200	10,000

Obtain confidence interval for odds ratio at 5% level of significance. **5**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
STATISTICS (Principal) (Paper – VI)
ST – 346 (B) : Statistical Ecology
(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 meaning.

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

a) In each of the following cases, choose the correct alternative from the alternatives A to D. **(1 each)**

i) The time at which population gets doubled in an exponential model is

A) $k \log_e 2$ B) $2e^k$ C) $\frac{\log_e 2}{k}$ D) $2 \log_e k$

ii) In logistic growth model, the growth rate $\frac{dN_t}{dt}$ is symmetric around.

A) k B) $\frac{k}{2}$ C) 2k D) k^2

iii) In removal method for estimating population size (N) when there are only 2 removals of sizes n, and n_2 respectively, Zippin's estimator of N is equal to

A) $\frac{n_1^2}{n_1 - n_2}$ B) $\frac{n_1 n_2}{n_1 - n_2}$ C) $\frac{n_2^2}{n_1 - n_2}$ D) $\frac{n_1^2}{n_2 - n_1}$

iv) If S is the total no. of species in a community and n is sample size then Menhinick's richness index is

A) $\frac{S}{\sqrt{n-1}}$ B) $\frac{S-1}{\sqrt{n}}$ C) $\frac{S}{\sqrt{n}}$ D) $\frac{S-1}{\sqrt{n-1}}$

b) In each of the following cases, state whether the given statement is **true** or **false**. **(1 each)**

i) Logistic growth model is sigmoidal.

ii) Maximum growth rate is attained earlier in Gombertz model as compared to logistic model.

c) i) Define closed population.

ii) Define stable equilibrium. **(1 each)**

d) i) Explain, in brief, rare fraction curves.

ii) State the two situations where geometric distribution is applicable to model the species abundance. **(1 each)**

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

a) Describe quadrat sampling method for estimating population density in a forest. Also discuss scope and limitations of quadrat sampling method.

b) Derive the expression for Gompertz growth model.

c) Describe capture-recapture method. Derive Peterson's estimator of population size (N) for single recapture in case of closed population.

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

a) For a Gompertz model, show that growth rate $\frac{dN_t}{dt}$ is maximum at $\frac{k}{e}$.

b) Given the following projection matrix

$$M = \begin{bmatrix} 2 & 5 \\ 0.6 & 0 \end{bmatrix}$$

Obtain stable population structure and comment on growth of the popultion.

c) Describe line transact method for estimating animal population structure in a forest. What is rational behind using exponential detection function.

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

a) i) What is meant by point to individual nearest neighbour distance is Poisson forest ? Derive maximum likelihood estimator of parameter λ. **6**

ii) Define Simpson's index for diversity (λ). Compute λ for the following data. **4**

Species	1	2	3	4
No. of individuals	3	9	12	4

b) i) For a logistic growth model, find the population size at which growth rate is maximum. **5**

ii) Discuss the states of equilibria in Gompertz model. **5**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (Paper – II)
Gg – 342 : Geography of Travel & Tourism
2008 Pattern

Time : 2 Hours Max. Marks : 40

N.B : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Diagrams and maps must be drawn ***wherever*** *necessary.*
iv) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**

a) What is 'Geo-tourism' ?

b) State any two advantages of caravan tourism.

c) Mention any two types of water transport tourism.

d) What is sustainable tourism development ?

e) State any two factors that influence choice of transport.

f) What is yatri bhavan ?

g) State any two disadvantages of road transport.

h) What is employment multiplier ?

i) Mention any two examples of effect of foreign elements on indigenous culture.

j) What is Humpi famous for ?

2. Write short answers (**any two**) : **10**

a) Discuss the concept of second home.

b) Describe the impact of recreation on wildlife.

c) State the importance of religious tourism.

P.T.O.

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

   a) Range of services in tourism sector.

   b) Impact of tourism on language.

   c) Goa.

4. Explain the need for different types of accommodation. Describe importance of house boat and dharamshala as tourists' accommodation. **10**

   OR

   Discuss the archeological and architectural importance of Ajanta and Ellora.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (Paper – III)
Gg.343 : Fundamentals of Geoinformatics – I
(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 :

   a) What are digital numbers ?

   b) What is image analysis system ?

   c) State the preprocessing functions in digital image analysis.

   d) Why do we need to classify images ?

   e) State the methods of atmospheric corrections.

   f) Why do we need to register an image ?

   g) What do you understand by image transformation ?

   h) What basic type of database queries performed in GIS ?

   i) State the basic two different types of overlay operations in GIS ?

   j) What is map algebra ? **10**

2. Write short answers (**any two**) :

   a) Describe BSQ format of digital image ?

   b) What is ISODATA approach ?

   c) Explain methods employed in multicriteria analysis. **10**

P.T.O.

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

   a) Supervised classification

   b) Topographic analysis

   c) Design of GIS report. **10**

4. Explain major types of queries in GIS.

   OR

   Discuss the steps followed in Digital Image Processing. **10**

[4017] – 452

T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (Paper – IV)
Gg - 344 : India – A Geographical Study
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

N.B. *: i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Diagrams and maps must be drawn ***wherever*** *necessary.*
iv) ***Use*** *of map stencils is* ***allowed****.*

1. Answer the following questions in **one** or **two** sentences : **10**

   a) State any two atomic power projects from south India.

   b) Mention any two institutional factors in agriculture.

   c) What is blue revolution ?

   d) What is meant by agricultural regionalization ?

   e) State any two locational factors in fertilizer industry.

   f) Mention the four most densely populated states of India.

   g) Which area is known as the sugar belt of Maharashtra ?

   h) State any four problems of urbanization faced by Indian cities.

   i) Why is the national highway number one popularly known as the Grand Trunk road ?

   j) Why has the western coast of India, more ports compared to the eastern coast ?

2. Write short answers (**any two**) : **10**

   a) Describe the bauxite rich areas of the peninsular India.

   b) Discuss the locational aspects of hydel-power stations in India.

   c) Explain the composition of population in India.

P.T.O.

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

   a) Significance of dry farming.

   b) Industrial regionalization.

   c) Recent developments in air transportation in India.

4. Discuss the green revolution and its socio-economic significance in India. **10**

   OR

   Critically analyse the importance of ports in the development of regional and foreign trade of India.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (2008 Pattern) Paper – V
Gg – 345 : Geography of Soils

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.

a) What do you understand by plant residue ?

b) Explain the term 'Micro Fauna'.

c) What is soil-surface climate ?

d) What are relic soils ?

e) What is hydration ?

f) What are permafrost conditions ?

g) What is Ulmic acid ?

h) What are heterotrophic bacteria ?

i) What is plant debris ?

j) What do you understand by rill erosion ? **10**

P.T.O.

2. Write short answers **(any two)** :

   a) What impact does fog have on the process on soil formation ?

   b) Why is deforestation a serious issue of soil degradation in India ?

   c) What role does insolation play in the development of Tropical soils ? **10**

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

   a) Salinisation

   b) Formation of humus

   c) Impact of overgrazing. **10**

4. Discuss the importance of the statement 'Soil is an important resource'

   OR

   Discuss the role of climate and relief in the process of soil formation. **10**

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[4017] – 454

T.Y. B.Sc. (Semester – IV) Examination, 2011
GEOGRAPHY (Paper – VI)
Gg.346 : Fundamentals of Geoinformatics – II
(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 :

   a) What is function of Landsat satellite ?

   b) What is the spatial resolution of SPOT data ?

   c) Name any two-satellite type.

   d) What is satellite sensor ?

   e) Give any two advantages of multispectral images.

   f) What is 'spectral resolution' ?

   g) What are the advantages of infrared scanners ?

   h) State the types of resolution.

   i) What is a polar orbiting satellite ?

   j) What is IRS ? **10**

P.T.O.

2. Write short answers (**any two**) :

   a) What is the use of radar images ?

   b) What is sun synchronous satellite ?

   c) Describe annotation strip on satellite image. **10**

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

   a) IRS series satellites

   b) SPOT

   c) Use of satellite data in resource studies. **10**

4. Describe the uses of satellite data in environmental studies.

   OR

   Discuss the advantages of Thermal infrared images. **10**

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[4017] – 455

T.Y. B.Sc. (Semester – IV) Examination, 2011
MICROBIOLOGY (Paper – I)
MB-341 : Medical Microbiology – II
(2008 Pattern) (New)

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 :

A	**B**
1) Influenza virus	a) Nonenveloped RNA virus
2) Hepatitis A virus	b) Enveloped DNA virus
3) Hepatitis B virus	c) Enveloped RNA virus with reverse transcriptase
4) HIV	d) Eukaryotic genome
5) Candida albicans	e) Segmented genome (eight pieces)

B) Choose the correct option :

1) Deafness is the side effect of
   a) Penicillin b) Streptomycin
   c) Griseofulvin d) Nystatin
2) The only semisynthetic antibiotic from the following is
   a) Amoxycillin b) Penicillin G
   c) Streptomycin d) Actinomycin D
3) Rifampicin inhibits
   a) RNA synthesis b) DNA synthesis
   c) Cell wall synthesis d) Cell membrane synthesis
4) P-aminobenzoic acid has structural similarity with
   a) Streptomycin b) β -lactam antibiotics
   c) Nystatin d) Sulphonamides
5) Nalidixic acid inhibits
   a) Swivelase b) RNA polymerase
   c) DNA gyrase d) Dihydrofotate reductase

P.T.O.

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

   A) Zidovudine

   B) Cryptococcosis

   C) Biochemical mechanism of drug resistance with respect to penicillin.

3. Attempt **any two** :

   A) Diagrammatically represent Hepatitis B virus.

   B) Describe mode of action of metronidazole.

   C) Comment on nystatin.

4. Attempt **any one** :

   A) What is chemotherapy ? Explain routes of drug administration.

   B) i) Describe asexual cycle of plasmodium species.

      ii) Explain pathogenesis of Rinderperst virus.

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T. Y. B. Sc. (Semester – IV) Examination, 2011
MICROBIOLOGY (Paper – IV) (2008 Pattern)
MB-344 – Immunology – II (New)

Time : 2 Hours Max. Marks : 40

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

1. Attempt the following : **10**

a) Define :

i) Attenuation

ii) Lymphokines

iii) Antisera

b) State **True/False** :

i) Delayed HS is mediated by antibodies.

ii) By cytosolic pathway Ag is processed into MHC class II.

c) Match the following :

A	**B**
i) Bombay blood group	a) Latent period
ii) HLA typing	b) hh genotype
iii) Primary immune response	c) ADCC
iv) Antitetanus serum	d) Microcytotoxicity
v) NK cells	e) Antitoxin

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

a) Diagramatically illustrate mechanism of type I allergy.

b) Explain-role of antibody in cell cytotoxicity.

c) Compare in tabular form HLA class-I and class-II molecules.

P.T.O.

3. Write short notes on (**any two**) : **10**

   a) Cytokines

   b) Types of grafts

   c) Biochemistry of ABO blood group antigens.

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

   a) Describe T_H cell and B-cell interaction.

   b) Describe genetically modified and live attenuated vaccines.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
MICROBIOLOGY (Paper – V)
MB – 345 : Fermentation Technology – II
(2008 Pattern) (New)

Time: 2 Hours Max. Marks : 40

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

1. A) Fill in the blanks :
   a) The pH of a typical present day American beer is _____
   b) The organism used in the fermentation of streptomycin is _____
   c) The most common bacterium for the industrial fermentation of Lactic acid is _____
   d) In Vinegar fermentation, the alcohol content of the fermentation medium is adjusted to a concentration upto _____%.
   e) In citric acid fermentation, the addition of the solvent, _____ to the medium increases the tolerance of Aspergillus to metal ions like Mn, Zn, Fe.

   B) Match the following :

A	**B**
1) DPT	a) Leavening of dough
2) Baker's yeast	b) Cunninghamella blakesleeana
3) Swiss cheese	c) Laundary Industry
4) Hydrocortisone	d) Propionic acid bacteria
5) Amylase	e) Combined bacterial vaccine

2. Attempt **any two** :
   a) Describe the production process of yeast as SCP.
   b) Explain the production process of fruit-flavoured yogurt.
   c) Explain the vitamin B_{12} fermentation process.

P.T.O.

3. Attempt **any two** :

   a) Explain briefly the process of mashing in brewing of beer.

   b) Describe the fermentation process in glutamic acid production.

   c) Explain the production process of thuricide. Add a note on the biological role of thuricide as a biocontrol agent.

4. Attempt **any one** :

   a) Explain the chemical changes occurring during a typical penicillin fermentation. Briefly explain the recovery of penicillin.

   b) Enlist the uses of amylases. Explain the production process of bacterial amylases. Add a note on the recovery of amylases.

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T.Y. B.Sc. (Sem. – IV) Examination, 2011
MICROBIOLOGY (Paper – VI)
MB – 346 : Soil & Agricultural Microbiology
(2008 – Pattern) (New)

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. Attempt the following : **10**

a) Define :

i) Peat soil

ii) Humus

iii) Bioremediation.

b) State **true** or **false** :

i) Leghaemoglobin protects nitrogenase from oxygen toxicity.

ii) Methanogenic bacteria are cubacteria.

c) Enlist two pesticide degrading organisms.

d) Write chemical reaction of nitrogen fixation.

e) Agrobacterium sps. causes _____ types of plant disease.

f) _____ sps. of Rhizobium grows in root nodules of trifolium.

g) What is in situ leaching ?

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

a) Describe sulphur cycle with the help of diagram.

b) Compare in tabular form between chemical fertilizers and biofertilizers.

c) Describe production of BGA bioinoculant.

P.T.O.

3. Write short notes on (**any two**) : **10**

   a) Mycorrhiza

   b) Hemicellulose degradation

   c) IPM .

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

   a) Describe spot disease with the help of following points.

      i) Causative agent

      ii) Plant affected

      iii) Disease cycle

      iv) Control.

   b) Describe biogas production with the help of following points.

      a) Raw materials

      b) Organisms involved

      c) USAB design of biogas plant (diagram)

      d) Applications.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE (Paper – I)
EL-341 : Advanced Communication Systems
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** of the following :
   a) State one disadvantage of DPSK as compared to BPSK. **1**
   b) Write any two applications of Doppler Radar. **1**
   c) What is Balanced modulator ? **1**
   d) List one advantage of Quadrature Detector. **1**
   e) "Only amplitude of carrier varies with respect to Binary modulating signal in case of QASK modulation technique". Comment. **2**
   f) If the audio frequency range is from 15 Hz to 15 KHz. What is minimum sampling frequency as per sampling theorem ? **2**
   g) Calculate the length of a half wave dipole antenna for a frequency of 75 KHz. **2**
   h) "Folded dipole antenna is used to increase the directivity". Comment. **2**

2. Attempt **any two** of the following :
   a) Explain synchronous detection with suitable block diagram. Write its advantages. **4**
   b) Describe principle of PCM. What is quantization error ? **4**
   c) Derive the wave equation for conductor in terms of magnetic flux density $(\overline{B})$. **4**

P.T.O.

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

   a) Explain the working of FM Transmitter, including pre-emphasis circuit, with block diagram. **4**

   b) With suitable block diagram, explain working of mobile receiver. **4**

   c) Discuss slope overload distortion and Granual noise in case of Delta modulation system. **4**

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

   a) Explain any one method of SSB generation. Derive the necessary expression for SSB-SC output modulated signal. **6**

   b) Draw the block diagram of colour TV Transmitter and describe its working. **6**

   c) i) Write short note on "Marconi antenna".

      ii) Explain following antenna parameters :
      Power gain and Directivity. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE
EL-343 : Power Electronics (Paper – III)
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

Notes : *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) Draw the phasor diagram for three phase A.C. **1**
   b) Define the term Reverse Recovery Time of a diode. **1**
   c) Draw switching characteristic of power MOSFET. **1**
   d) What are the ways of protecting people from hazards caused by electricity ? **1**
   e) A single phase full wave rectifier has purely resistive load with peak voltage 220 V, 50 Hz and load of 4 Ω. Find
      a) V_{dc}, I_{dc} b) Efficiency **2**
   f) A step-up chopper has a resistive load of 8 Ω and input voltage V_s = 10V. If t_1 = 0.6 millisecond, t_2 = 0.4 millisecond, L = 1 mH. Determine peak to peak ripple current and instantaneous output voltage. **2**
   g) State and define the parameters related to thyristor turn-off. **2**
   h) What is spike guard ? Why it used ? **2**

2. Attempt **any two** of the following :
   a) Classify power diodes based on recovery characteristics and explain the specification parameters of them. **4**
   b) Explain working of single phase full wave rectifier with centre tapped transformer. Draw input output waveforms. Obtain expression for efficiency and ripple factor. **4**
   c) What is switching mode regulator ? Explain boost regulator with the help of circuit diagram and waveforms. Obtain expression for switching period T. **4**

P.T.O.

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

   a) Explain working principle of phase angle control used in AC voltage controller with input/output waveforms. Obtain expression for output voltage. **4**

   b) What are types of power meters ? Explain construction and working principle of any one of power meter. **4**

   c) State the operating modes of dc-motor drive. Explain any one of them in brief. **4**

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

   a) Explain working of single phase dual converter with circuit diagram and input/output waveforms. Distinguish between full converter and dual converter. **6**

   b) Draw the block diagram of online and off line UPS. Explain its working. Give any two applications. **6**

   c) i) Explain the working of single phase full bridge inverter. Why voltage control of inverter is needed ? **3**

   ii) Write note on clamp on meter. **3**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE (Paper – IV)
EL-344 : Electronic Materials and Devices
(2008 Pattern) (New Course)

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****.*

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

a) "Copper not only possesses low resistivity but other features". Comment. **1**

b) Define dielectric strength. **1**

c) How extrinsic materials are prepared ? **1**

d) State classification of polymer. **1**

e) What is P-type and N-type semiconductor ? **2**

f) State different types of crystals. **2**

g) What is NEMS ? **2**

h) Describe recombination process in semiconductor. **2**

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

a) Describe the construction of resonant tunneling diode with proper diagram. **4**

b) Explain orientational polarization. **4**

c) Explain the phenomenon of doping in P-type of semiconductor. **4**

P.T.O.

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

   a) Write note on a Ionic crystals. **4**

   b) Explain the working principle of LED with energy band diagram. **4**

   c) Consider a pure Si crystal that has $\in_r$ = 11.9 (a) What is the electronic polarizability (b) Suppose that a Si crystal sample is electroded on opposite faces and has a voltage applied across it. By how much is the local field greater than the applied field ? **4**

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

   a) What is unit cell ? How it is used to explain lattice structure ? Give example. **6**

   b) Explain with suitable energy band diagram of intrinsic n-type and P-type semiconductor. **6**

   c) What is Piero-electricity ? Explain with suitable example. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE
EL – 345 : Mathematical Methods and Analysis using MATLAB
(Paper – V) (New Course) (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**.*

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

a) Define continuous time signal. **1**

b) Create a row vector v for values from 1 to 10. **1**

c) Write Fourier series expansion for an even function. **1**

d) What do you mean by curve fitting ? **1**

e) Explain the format of linspace ( ) MATLAB command. **2**

f) State the main difference between script file and function file in MATLAB. **2**

g) Write the polyfit command to fit an exponential function $y = be^{mx}$. **2**

h) Explain the format of ode23 built-in function in MATLAB. **2**

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

a) Define a Fourier series for a periodic function and state Dirichlet's conditions. **4**

b) Find Laplace transform of $f'(t)$. **4**

c) Find the values of a_0 and a_1 so that $y = a_0 + a_1 x$ fits the following data : **4**

x	0	2	5	7
y	–1	5	12	20

P.T.O.

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

   a) State the general format of 2D plot command in MATLAB. Explain in brief 'style-option' argument. **4**

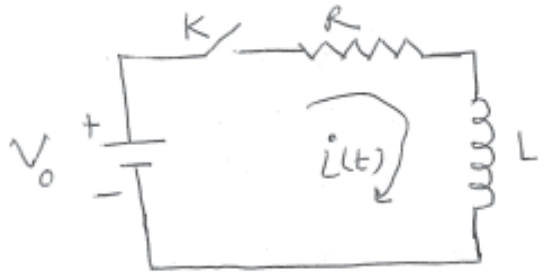
   b) Find inverse Laplace transform of $\frac{3S+7}{S^2-2S-3}$. **4**

   c) Obtain the solution of Poisson equation in 3D Cartesian coordinate system using separation of variable method. **4**

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

   a) Expand f(x)=sin(x), $0 < x < \pi$ in a Fourier cosine series. **6**

   b) In the following series RL circuit switch K is closed at time t = 0. Determine the current using Laplace transform after switch K is closed. (use initial condition $i_{(0^+)} = 0$) **6**



   c) Explain 3D graphical facility provided by MATLAB with suitable examples. (At least 2 examples). **6**

OR

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

   a) Obtain the Fourier transform of $f(x) = \begin{cases} 1, & |x| < 4 \\ 0, & |x| > 4 \end{cases}$ **4**

   b) If L{f(t)} = F(s) then prove that, $L\{f(at)\} = \frac{1}{a}F\left(\frac{s}{a}\right)$. **4**

   c) Explain the format of following MATLAB commands : **4**

   i) title ii) xlabel

   iii) ylabel iv) text

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE (New Course) (2008 Pattern)
EL – 346 (A) : Instrumentation (Paper – VI)
(Optional)

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.*

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

a) State one disadvantage of null method compared to deflection method of measurement system. **1**

b) What do you mean by interference noise ? **1**

c) List disadvantage of charge amplifier. **1**

d) Write the generalized operational transfer function for measurement system. **1**

e) State three radio broadcast stations included in NIST time / frequency services. **2**

f) Transconductance amplifier is a voltage to frequency converter : comment. **2**

g) Signal generator is talker as well listener in GPIB system : comment. **2**

h) The modifying inputs are used to change only desired inputs : comment. **2**

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

a) Explain ramp response of first - order system. **4**

b) Explain ground loop with suitable diagram. Write the method to minimise the problem associated with the ground loop. **4**

c) Describe the difference between deflection and null type method, giving suitable example. **4**

P.T.O.

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

   a) What is first order system ? Explain it with suitable example. **4**

   b) Explain DBT bus of IEEE - 488/GPIB. **4**

   c) Explain working of spectrum analyzer with suitable block diagram. **4**

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

   a) With the help of block diagram, explain input-output configuration of measurement system. **6**

   b) What do you mean by multichannel DAS ? Explain its working with multiplexing the outputs of S/H circuit using suitable block diagram. **6**

   c) What is the purpose of Absorption meter ? Explain simple series resonant and parallel resonant type of absorption meter. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC SCIENCE (Paper – VI) (2008 Pattern)
EL – 346 (B) : Consumer Electronics
(New Course) (Optional)

Time : 2 Hours Max. Marks : 40

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

1. Attempt **all** the following :

a) What is MP3 ? **1**

b) What is CATV ? **1**

c) State frequency range used for bluetooth communication. **1**

d) What is wavelength range of microwaves used in microwave ovens ? **1**

e) State any two characteristics of Bar code. **2**

f) State role of microcontroller in washing machine. **2**

g) State any two characteristics of speaker. **2**

h) "The print quality depends on number of pins used in head of dot matrix printer" comment. **2**

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

a) Explain working principle of condenser microphone with neat diagram. **4**

b) What is scanner ? Explain scanner with suitable diagram. **4**

c) Compare the features of LCD TV with plasma T.V. **4**

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

   a) Write short note on GPRS system. **4**

   b) Explain with neat diagram CCTV. Where it is used ? **4**

   c) Explain the four functions controlled by air conditioners. **4**

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

   a) Draw the functional block diagram of microwave oven along with power supply unit. Explain each block in brief. **6**

   b) Draw block diagram of Digital camera. Explain each block. **6**

   c) Explain with neat block diagram GPS Navigation system. **6**

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES
DS – 342 : Economic Aspects of War (2008 Pattern)
(Paper – II)

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) Define " Wartime economy".
   2) State any two merits of peacetime economy.
   3) Define "Development".
   4) What do you mean by war potential ?
   5) State any two effects of war on society.
   6) Write any two demerits of peacetime economy.
   7) What do you mean by defence ?
   8) Who was the India's Defence Minister during Chinese aggression of 1962 ?

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) How real cost of war would be calculated ?
   2) Explain the demerits of wartime economy.
   3) Write in brief the causes of increasing India's defence expenditure from 1971 to 2009.

3. Write short notes on (**any two**) : **8**
   1) Effects of war on Industry.
   2) Economic cost of war
   3) Merits of wartime economy.

4. Answer in **16** to **20** sentences (**any one**) **8**
   1) "Defence should be development oriented and development should Defence Oriented". Do you agree ? Justify.
   2) Explain in detail any two economic elements of wave potential.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – III
DS – 343 : Disaster 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 Disaster Management.
   2) Write any two roles of volunteers in Disaster Management.
   3) What do you mean by Pre-Disaster Plan ?
   4) State the meaning of Rehabilitation.
   5) Define Disaster.
   6) What do you mean by Morale ?
   7) Write the full form of NGO.
   8) Define Development.

2. Answer in **eight** to **ten** sentences (**any two**) : **8**
   1) Why technical assistance in needed in Disaster Management ?
   2) Discuss the post disaster emergency phase.
   3) Discuss the role of NGOs in Disaster Management.

3. Write short notes on (**any two**) : **8**
   1) Yokohama Message and Strategy.
   2) Role of the Local Bodies in Disaster Management.
   3) Elements of Disaster Management.

4. Answer in **8** to **ten** sentences (**any one**) : **8**
   1) What are the principles of Planning ?
   2) What are the Psychological and Sociological consequences of Disaster ?

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – V
DS-345 : Information Technology and National Security
(2008 Pattern) (New)

Time : 2 Hours Marks : 40

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

1. Answer in **two** to **four** sentences : **16**
   1) Define Night vision.
   2) State the meaning of surveillance.
   3) What do you mean by missile defence system ?
   4) State the meaning of Battlefield Information System.
   5) What do you mean by CAM ?
   6) Define Artificial Intelligence.
   7) Define Hybrid computer.
   8) What do you mean by ISAM ?

2. Answer in **8** to **10** sentences **(any two)** : **8**
   1) Explain importance of information system during war.
   2) Write a note on Target acquisition system.
   3) Discuss "Computerized Battle management system.

3. Write short notes on **(any two)** : **8**
   1) Night vision.
   2) R&D simulator
   3) Application of IT in weapon system.

4) Answer in **16** to **20** sentences **(any one)** : **8**
   1) Discuss information technology and its importance on National Security.
   2) Do you think computer application in Defence management is necessary ? Justify your answer.

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[4017] – 471

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VI
DS – 346 (A) : Indian Military System (II) (Optional)
(2008 Pattern) (New)

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) What was the aim of Akbar for battle of Haldighat ?
   2) Which weapon it was introduced by Babar to Indians ?
   3) Write any two names of India's Southern empire.
   4) State the meaning of Sanad.
   5) What do you understand by "Panch-Hazari" ?
   6) Write any two military reforms introduced by Ghiasuddin Balban.
   7) What was the aim of Babar for first battle of Panipat ?
   8) Write the weapons of Sultan.

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) Explain in brief the significance of first battle of Panipat in military history of India.
   2) Write in brief Art of warfare of Sultan.
   3) Explain the concept of Mangabdar System of Mughals.

3. Write short notes on (**any two**) : **8**
   1) Majibkhan.
   2) Babar as a founder of Mughal Empire
   3) Significance of Third Battle of Panipat.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Analyse the causes of downfall of Sultans.
   2) Explain in detail the first battle of Panipat.

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P.T.O.

[4017] – 471

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VI
DS – 346 (B) : Maratha Military System (II) (Optional)
(2008 Pattern) (New)

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 tactics was introduced by Shivaji ?
   2) By whom Sambhaji was killed ?
   3) When and where the Third Anglo-Maratha War took place ?
   4) Why and between whom the Battle of Bhopal was fought ?
   5) Who was Tarabai ?
   6) Which warfare was adopted by Santaji and Dhanaji ?
   7) Why Sahu was released by Mughals ?
   8) On which fort Rajaram took Asylum ?

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) Explain the basic cause of Anglo-Maratha conflict.
   2) What were the implications of Battle of Bhopal ?
   3) Write in brief the significance of third battle of Panipat.

3. Write short notes on (**any two**) : **8**
   1) Kanhoji Angre.
   2) Impact of Third Battle of Panipat.
   3) Santaji.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Assess Shivaji as a "Military Leader".
   2) Analyse the causes of downfall of Maratha.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VI
DS – 346 (C) : Indian Wars Since Independence (II) (Optional)
(2008 Pattern) (New)

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) When and between whom the Simla agreement was signed ?
   2) Who was the signatory authority on behalf of Pakistan during surrender in 1971 Dec. ?
   3) Which front was decisive during Indo-Pak war of 1971 ?
   4) On behalf of Maldive who requested India to intervene in Maldive ?
   5) Who was the chief of Army of Indian Army during 1971 War ?
   6) Why India sent her forces to east Pakistan in 1971 ?
   7) What was aim of Pakistan during Kargil of 1999 ?
   8) Why India sent her forces to Srilanka ?

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) What was the grand strategy of India during Indo-Pak war of 1971 ?
   2) What were the objectives of India during operation Pawan ?
   3) How India came to know about seriousness of Kargil episode ?

3. Write short notes on (**any two**) : **8**
   1) Objectives of Pakistan during Kargil of 1999.
   2) Simla Agreement of 1972.
   3) Role of I.P.K.F. in Maldive.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Why India being recognised as a "Dominant Power" in South Asia after 1971 ? Discuss.
   2) Discuss in brief the Kargil Episode of 1999 and explain the role of U.S.A. and China in it.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VII
DS – 347 (A) : Military Psychology (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) What is 'Soldiering' ?
   2) What is difference in Morale and Moral ?
   3) What is difference in Management and leadership ?
   4) Define 'Rumours'.
   5) Define 'Discipline'.
   6) Define 'Motivation'.
   7) What is organisational psychology ?
   8) Define 'Psychological warfare'.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain the psychological view of soldiering.
   2) How psychology helps in enhancing morale in armed forces ?
   3) Explain combat stress and its remedial measures.

3. Write short notes on (**any two**) : **8**
   1) Propaganda
   2) Mental Toughning in war
   3) Military leadership.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Discuss the military uses of psychology.
   2) Explain the methods of psychological warfare.

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P.T.O.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VII
DS – 347 (B) : Defence Journalism and National Security (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **2** to **4** sentences **each** : **16**
   1) Define 'Air force'.
   2) Define 'Army'.
   3) Define 'Navy'.
   4) Write the role of Coast Guard.
   5) Introduce IL-76.
   6) What is DPSU ?
   7) Write the responsibility of Supreme Commander of Indian Armed Forces.
   8) What is Counter Terrorism ?

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) What media ethics are needed in defence reporting ?
   2) Why national security issues must get wide media coverage ?
   3) Make a press report of Republic Day parade.

3. Write short notes on (**any two**) : **8**
   1) Defence reporting in India.
   2) Role of defence reporter.
   3) Prospects in defence journalism.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Suggest measures to develop relation between media and military.
   2) Make a press report on the prohibition of ABC Weapons.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VII
DS – 347 (C) : Defence Preparedness of India – II (Optional)
(2008 Pattern) (New)

Time : 2 Hours | Max. Marks: 40

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

1. Answer in **two** to **four** sentences : **16**
   1) Write any two objectives of Indian Army.
   2) What do you mean by Defence Preparedness ?
   3) Define perspective planning in defence.
   4) Define war potential.
   5) Write any two Emerging challenges to India's Security.
   6) Write any two limitations of Indian navy.
   7) State any two functions of the cabinet committee on security.
   8) What are the main functions of Ministry of Defence ?

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain commands of Indian Army.
   2) Discuss achievements of Indian Navy.
   3) Describe weapon system of Indian Air-force.

3. Write short notes (**any two**) : **8**
   1) National Security Advisory Board.
   2) Department of Defence Production.
   3) Achievements of Indian Air-Force.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Write a note on "Defence Budgeting and Planning in India".
   2) Explain Indo-Pakistan war potential.

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[4017] – 473

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VIII
DS - 348(A) : Refugee Studies
(2008 Pattern) (New)

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** to **4** sentences **each** : **16**
   a) What do you understand by Non Refoulment ?
   b) What is meant by persecution ?
   c) What do you mean by well founded fear ?
   d) Chakma refugees are from which State ?
   e) What is voluntary repatriation ?
   f) State any two reasons for loss of status of refugees.
   g) What do you mean by migration ?
   h) What do you understand by stateless person ?

2. Answer in **8** to **10** sentences (**any 2**) : **8**
   a) Write briefly on Rights of refugees.
   b) Examine the causes of migration.
   c) Explain the principle of Non Refoulment.

3. Write short notes on (**any 2**) : **8**
   a) Comment on Refugee law in India.
   b) Describe 1951 convention relating to the status of refugee.
   c) Examine the role of UNHCR.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   a) Discuss the role of durable solutions to refugees.
   b) Evaluate the plight of Tamil Refugees from Sri Lanka and their solution.

P.T.O.

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[4017] – 473

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VIII
DS – 348(B) : Study of United Nations
(2008 Pattern) (New)

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** to **4** sentences **each** : **16**
   a) What do you understand by Disarmament ?
   b) What are the principal organs of UN ?
   c) What do you mean by Human rights ?
   d) When was UN established ?
   e) Write full form for ICCPR.
   f) How many permanent members are there in UN Security Council and name them.
   g) Write full form for UNESCO.
   h) State any two purposes of United Nations.

2. Answer in **8** to **10** sentences (**any 2**) : **8**
   a) Write briefly on principle of self determination.
   b) Examine the role of UN in disarmament.
   c) Explain the importance of peace keeping in International conflict.

3. Write short notes on (**any 2**) : **8**
   a) Comment on the role of UN Security Council in maintaining world peace.
   b) Analyze the importance of UDHR.
   c) Examine the role and functions of Economic and Social Council.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   a) Discuss the limitation and consequences of the UN Security Council.
   b) Evaluate the provisions relating to disarmament in UN Charter.

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[4017] – 473

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – VIII
DS – 348 (C) : Laws of War and Peace (Optional)
(2008 Pattern) (New)

Time : 2 Hours Max. Marks : 40

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

1. Answer in **two** to **four** sentences : **16**
   1) Define State.
   2) State the meaning of Intervention.
   3) Write the meaning of Self-determination.
   4) Define Arms control.
   5) State the meaning of Air-warfare.
   6) What do you mean by Law of Treaties ?
   7) Define International Relations.
   8) State the meaning of Sea-Power.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain types of States
   2) Discuss Right to self-defence
   3) Explain the merits of collective security.

3. Write short notes (**any two**) : **8**
   1) Recognition of States
   2) Interventions
   3) Land-Warfare.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Write a note on the Laws of War.
   2) Explain U.N. system towards pacific settlement of Disputes.

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[4017] – 474

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – IX
DS- 349 (A) Management of Defence Production and Logistics in India
(2008 Pattern) (New) (Optional)

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 'Foreign collaboration'.
   2) Write the purpose of ordnance factories.
   3) What is indigenous production ?
   4) Write the aim of supply chain management.
   5) Define the 'logistics'.
   6) What is 'Joint venture' ?
   7) What is 'Economic Mobilisation' ?
   8) Define 'Military potential'.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Highlight on the problem of Foreign collaboration.
   2) Suggest measures for integrated defence logistics.
   3) Explain 'Just in Time Concept'.

3. Write short notes on (**any two**) : **8**
   1) Ordnance Factories.
   2) DRDO.
   3) Dept. of Defence Production.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain mobilisation of logistics elements for war.
   2) Explain the working of supply Chain Management.

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P.T.O.

[4017] – 474

T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – IX
DS- 349 (B) Internal Security of India – II (Optional) (2008 Pattern) (New)

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) State the meaning of N.G.O.
   2) What do you mean by Secessionist Movements ?
   3) Define "Terrorism".
   4) What do you mean by Counter Insurgency ?
   5) Define "Internal Security".
   6) State any two challenges to India's Internal Security.
   7) What do you mean by LT of Pakistan sponsored ?
   8) What do you mean by Non-State Actor ?

2. Answer in **8** or **10** sentences (**any two**) : **8**
   1) What do you mean by Cross-Border Terrorism ?
   2) Write a few lines on "Insurgency".
   3) Explain the role of media to deal with internal security problem.

3. Write short notes on (**any two**) : **8**
   1) Concept of Terrorism.
   2) Role of force during counter insurgency.
   3) Role of Central Government for Internal Security.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Describe the role of I.S.I. of Pakistan to jeoparadise internal security of India.
   2) Explain any one Secessionist Movement in India which considered as a challenge to internal security.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
DEFENCE AND STRATEGIC STUDIES – IX
DS- 349 (C) India's Maritime Security – II (Optional) (2008 Pattern) (New)

Time : 2 Hours | Max. Marks : 40

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

1. Answer in **two** to **four** sentences **each** : **16**
   1) Define Strategic Environment.
   2) State the meaning of Maritime Trade.
   3) Define Territorial Sea.
   4) Write the meaning of Maritime Elements.
   5) What do you mean by 'zone of peace' ?
   6) Define Exclusive Economic Zone (EEZ).
   7) Define sea-power.
   8) State the meaning of 'Military Maritime Strategy'.

2. Answer in **8** to **10** sentences (**any two**) : **8**
   1) Explain India in the oceanic system.
   2) Discuss importance of maritime resources.
   3) Explain concept of Maritime security.

3. Write short notes on (**any two**) : **8**
   1) Maritime Assets.
   2) Strategic significance of the Indian Ocean.
   3) Policies of U.S.A. in the Indian Ocean.

4. Answer in **16** to **20** sentences (**any one**) : **8**
   1) Explain importance of Maritime security to National Economy.
   2) Discuss 26/11 Mumbai Attack and its impact on Indian Security System.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ENVIRONMENTAL SCIENCES (Paper – I)
(2008 Pattern) (New)
ENV 341 Aquatic Ecosystems and Management

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 lotic system.

   b) What do you mean by brackish water ?

   c) Write two examples of lentic system.

   d) Define restoration.

   e) Name any 2 zones of marine system.

   f) Write any 2 ecological significances of wetlands.

   g) Define eco-tourism.

   h) Name any 2 phytoplankton.

   i) What is GIS ?

   j) Where does the Trummen lake located ?

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

   a) Estuarine biota

   b) Restoration of Chilika lake

   c) Impact of tourism.

P.T.O.

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

   a) Discuss the consequences of exploitation of wetlands.

   b) Explain the ecological classification of freshwater organisms.

   c) Differentiate lotic and lentic system with respect to the biota.

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

   a) Define mangroves. Mention their distribution and significance.

   b) Explain the need of interactions. Support the answer with any five types of interactions occurring in aquatic organisms.

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T.Y.B.Sc. (Semester – IV) Examination, 2011
ENVIRONMENTAL SCIENCE (Paper – III)
ENV - 343 : Air & Soil Quality
(New Course) (2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions**: 1) **All** questions are **compulsory**.*
*2) **All** questions carry **equal** marks.*
*3) 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 meant by Global Warming ?

b) Define air pollution.

c) Give any 2 effects of Acid rain.

d) What is meant by soil aeration ?

e) Give the full form of GIS.

f) State the difference between Rill and Sheet erosion.

g) Define soil pollution.

h) When did Chernobyl Disaster occur ?

i) Enlist any 2 types of air pollutants.

j) Give the components of soil.

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

a) Give any 2 sources and explain control of air pollution.

b) How to control vehicular pollution ?

c) Describe the factors influencing soil structure and plant growth.

P.T.O.

3. Write short notes on (**any two**)**:** **10**

   a) High Volume Sampler (HVS) with labelled diagram.

   b) Bhopal Disaster.

   c) Soil Conservation methods (any 5).

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

   a) Explain in detail chemical and photochemical reactions in the atmosphere.

   b) Describe various ways adopted for reclaimation of contaminated soil.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ENVIRONMENTAL SCIENCES
(New Course) (Paper – IV) (2008 Pattern)
ENV-344 : Current Issues in Environmental Sciences – II

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) Give the name of the leader of Narmada Bachao Andolan.

b) Define rainwater Harvesting.

c) What is difference between natural disaster and environmental hazard ?

d) What is environmental model ?

e) Define decertification.

f) What is Green house effect ?

g) Define eutrophication.

h) Give the fullform of SEZ.

i) Give any two examples of environmental hazards.

j) Define secondary air pollutant.

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

a) Apiko movement.

b) Importance of landuse policy.

c) Ganga Action plan.

P.T.O.

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

   a) Explain how vehicular pollution affect the Urban air quality.

   b) Describe various environmental problems faced by India.

   c) Explain the toxicity associated with fluroide.

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

   a) Define wetland. What are the causes of wetland degradation and add a note on wetland conservation.

   b) Explain in detail the process of formation and reclamation of Usar, Alkaline and Saline soil.

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[4017] – 479

T.Y. B.Sc. (Semester – IV) (New Course) Examination, 2011
ENVIRONMENTAL SCIENCES (Paper – V)
ENV – 345 : Environmental Governance and Equity : EMS and ISO 14000
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *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 in **1-2** lines **each** : **10**
   a) Write fullform of ISO.
   b) State any one constitutional provision for the protection of environment.
   c) What is polluter pays principle ?
   d) Write fullform of WHO.
   e) What is a generic standard ?
   f) What is standard limit of DO for class A quality water ?
   g) Mention any two functions of technical committee.
   h) Which act is called as 'Umbrella Act' ?
   i) What is meant by corrective action ?
   j) What is standard limit suggested by CPCB for industrial NO_2 emissions.
2. Write a short note on (**any two**) : **10**
   a) Environment management system.
   b) Need for Environmental standards.
   c) Environmental status report.
3. Answer **any two** from the following : **10**
   a) Explain any five objectives of environmental education.
   b) Which environment protection related aspects are included in NEP, 2006 ?
   c) Give an account on environmental governance and its implementation in India.
4. Attempt **any one** of the following question : **10**
   a) Discuss in detail on India's commitment towards environmental protection.
   b) What is EIA ? Explain importance of EIA with suitable example.

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T.Y.B.Sc. (Semester – IV) Examination, 2011
BIOTECHNOLOGY (Vocational)
Paper – V : Entrepreneurship Development
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

***Instructions** : 1) **Neat** diagrams must be drawn.*
*2) **All** questions carry **equal** marks.*
*3) **All** questions are **compulsory**.*

1. Answer the following questions in short : **10**
   a) What is entrepreneurial culture ?
   b) Define joint stock company.
   c) What is small scale industry ?
   d) What is SWOT ?
   e) What is market segmentation ?
   f) Give role of IDBI.
   g) Which information will you get from SISI ?
   h) Mention any two rules of excise.
   i) Define communication.
   j) What is the role of Pollution Control Board ?

2. Attempt **any two** of the following : **10**
   a) Describe the procedure for registration of small scale industry.
   b) Discuss the role of Chamber of commerce.
   c) Give scope and importance of marketing.

3. Write short notes on **any two** : **10**
   a) Interpersonal relations and communication skills.
   b) Distinguish between subsidies and incentives.
   c) Soft skills.

4. Attempt **any one** of the following : **10**
   a) What are key elements of entrepreneur ? Also discuss characteristics and types of entrepreneur.
   b) Describe various elements required for project formulation and give brief structure of the project.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
Computer Hardware and Network Administration (Vocational)
Paper – V : Entrepreneurship Development
(New Course) (2008 Pattern)

Time : 2 Hours Marks : 40

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

1. a) Attempt **all** of the following : **(10×1=10)**

   i) What is SIDBI ?

   ii) What is an Entrepreneurship ?

   iii) Explain the Term 'Asset' ?

   iv) Why do we go to MIDC ?

   v) Entrepreneurship Development Program of India is carried out under which Ministry ?

   vi) Which Tax is applicable for a Trading Firm ?

   vii) What is a meaning of SSI ?

   viii) Give any one characteristic of an Entrepreneur.

   ix) What is a 'Working Capital' ?

   x) Is 'Product' one of the important factors of Marketing Mix.

2. Attempt **any two** of the following : **(2×5=10)**

   a) What are the different types of Entrepreneurs ?

   b) Explain the importance of SWOT analysis.

   c) Explain the effect of Marketing Mix ?

P.T.O.

3. Attempt **any two** of the following : **(2×5=10)**

   a) Distinguish between Proprietary and a Partnership firm.

   b) What should be the criteria for selecting a new product or service ?

   c) What is the role of Human Resource Department in Entrepreneurship Development program of India ?

4. Attempt **any one** of the following : **(1×10=10)**

   a) What are the merits of a Co-operative Organization ? What are the various Funding Agencies in India ?

   OR

   b) What are the different taxes applicable for a business in india ? Explain any five.

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T.Y. B.Sc. (Semester – IV) (Vocational) Examination, 2011
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-345 (Paper – V)
(2008 Pattern)
Entrepreneurship Development

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Born entrepreneurs are those who are born in the family of entrepreneurs . True/false

b) 'NIESBUD' stands for _____

c) State Bank of India is dedicated to the tasks of entrepreneurial development. True/false

d) The minimum number of persons to form partnership is _____

e) Entrepreneurship is an innovative function as it involves doing things in a new and better way. True/false

f) The levy of Excise duty is connected to _____ of goods.
   a) Manufacture
   b) Sale proceeds

g) Choose correct Break Even Point (BEP) from the following statements.
   A. BEP is where Marginal Cost = Marginal Revenue
   B. BEP is where Average Cost = Average Revenue
   C. BEP is where Total Cost = Total Revenue

h) The concept of market segmentation is based on the assumption that the markets are ..... (homogeneous/heterogeneous)

P.T.O.

i) Product is one with the capacity to satisfy our needs. True /False

j) Which of the following is not a Labour Act ?

A. The Factories Act

B. Negotiable Instruments Act

C. Shops and Establishment Act

D. Industrial Disputes Act.

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

a) What is marketing mix? What are its main elements ? Explain .

b) Write a note on "Sources of finance".

c) What is the main object of Factories Act, 1948 ? Enumerate the main provisions of this Act.

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

a) Explain any five techniques of "On the Job-Methods of Training".

b) Explain "Strategic Objectives".

c) Explain the functions of an entrepreneur.

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

a) "Sole proprietorship is form of business organization in which an individual invests his own capital, uses his own skill and intelligence in the management of its affairs and is solely responsible for the results of its operations". Elaborate the features, merits and demerits of this particular form of ownership structure.

b) "A new entrant in the entrepreneurial world has to search for a business opportunity". What are the methods adopted by potential entrepreneur to identify business opportunity ?

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T.Y. B.Sc. (Semester – IV) Examination, 2011
ELECTRONIC EQUIPMENT & MAINTENANCE
Vocational (Paper – V)
Entrepreneurship Development
(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 log tables, calculators is **allowed**.*

1. Answer the following. **(3×4=12)**

a) Answer the following : **(4×1=4)**

i) Define the term 'partnership'.

ii) Define the term marketing.

iii) What is meant by 'service industry' ?

iv) State any two qualities of a successful entrepreneur.

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

i) Entrepreneur must have good communication skills.

ii) Small scale industries are more susceptible to change in socio-economic conditions.

c) Answer the following : **(2×2=4)**

i) Explain the term marketing channels.

ii) Give the meaning of project report.

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

a) Explain the functions of an entrepreneur.

b) Distinguish between a business and profession.

c) Explain advantages and limitations of joint stock company.

P.T.O.

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

   a) Explain need and scope of entrepreneurship in modern society.

   b) Explain in brief Payment of Wages Act.

   c) Give the meaning of 'marketing strategy'.

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

   a) Explain the content of project report.

   b) Discuss identification of opportunities for starting a new business.

   c) Explain the key elements of an entrepreneur.

OR

4. Write short notes on following : **(3×4=12)**

   a) Cash flow

   b) Soft skills

   c) Market survey as a tool.

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T.Y. B.Sc. (Semester – IV) Examination, 2011
BIOTECHNOLOGY (Vocational)
Paper – VI : Microbial Biotechnology and Animal Biotechnology
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

Instructions : *1)* ***Neat*** *diagrams must be drawn.*
2) ***All*** *questions carry* ***equal*** *marks.*
3) ***All*** *questions are* ***compulsory****.*

1. Answer the following questions in short : **10**

   a) Define vaccine.

   b) What is BOD ?

   c) Name two approaches for primary separation of desired fermentation product.

   d) What is IL^2 ?

   e) Write the use of PDGF.

   f) Define infinite cell lines.

   g) Enlist the essential components of the medium used for culturing animal cells.

   h) What is sufer ?

   i) Enlist the commercially important products obtained from microbial activity (any four).

   j) What are patents ?

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

   a) Explain the types of stock cultures.

   b) Describe a typical industrial fermentor.

   c) Production of factor VIII – Discuss.

P.T.O.

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

   a) Stem cells.

   b) Purification of products of animal cells.

   c) Immobilization of microbial cells.

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

   a) What is transgenesis ? How can transgenic animals be produced ?

   b) With reference to fermentation, harvest and recovery describe the production of streptomycin.

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T.Y. B.Sc. (Vocational) (Semester – IV) Examination, 2011
Paper – VI : NETWORK CONCEPTS – II
(New Course)
Computer Hardware and Network Administration
(2008 Pattern)

Time : 2 Hours Max. Marks : 40

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

1. a) Attempt **all** of the following : **(10×1=10)**

i) What is Phishing ?

ii) What is a IDS ?

iii) What is Cryptography ?

iv) What is Router ?

v) What is VLAN ?

vi) What is a Gateway ?

vii) What is a VOIP ?

viii) What is a Shared Drive on Network ?

ix) What is a Broad Band ?

x) Give one application of a VPN.

2. Attempt **any two** of the following : **(2×5=10)**

a) Explain the importance of an Antivirus.

b) Write a note on Resource planning of a Hardware.

c) Explain the advantages of VOIP.

P.T.O.

3. Attempt **any two** of the following : **(2×5=10)**

   a) Give the steps to share a Drive on Network.

   b) What are Passive Attacks ? Explain with proper example.

   c) What is a proxy server ? Explain its use in internet sharing.

4. Attempt **any one** of the following : **(1×10=10)**

   a) Explain the concept of :
      1) Cold Sites
      2) Warm Sites
      3) Hot Sites
      4) Mirroring.

   b) Write the Installation Procedure for an Ethernet Card and configuring TCP/IP Protocol in Windows XP.

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[4017] – 493

T.Y. B.Sc. (Semester – IV) (Vocational) Examination, 2011
INDUSTRIAL MICROBIOLOGY (Paper – VI)
VOC-IND-MIC – 346 (2008 Pattern)
Molecular Biology and Recombinant DNA Technology

Time : 2 Hours Max. Marks : 40

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

1. Answer the following : **10**

a) Define : Chimeras.

b) Write recognition site and cutting site of Hind III.

c) Write two examples of genetic disorders.

d) Enlist the important features of pUC 18.

e) What is blue white screening ?

f) Name two modifications of PCR.

g) Represent diagrammatically only : action of Alkaline phosphatase.

h) Write True or False with reason :

Use of transgenic plants is beneficial.

i) Write the principle of Sanger's method of Nucleic acid sequencing.

j) Name the vectors developed for cloning in yeast.

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

a) Discuss in brief the techniques used to transfer foreign DNA to animals.

b) Compare manual and automated sequencing.

c) Justify : Recombinant vaccines are preferred to traditional vaccines in spite of their high cost.

P.T.O.

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

   Comment on :

   a) Use of artificial chromosomes as a vector.

   b) DNA fingerprinting.

   c) Non-radioactive labeling.

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

   a) What is site-directed mutagenesis ? Discuss PCR based methods of inducing such mutations and its applications in protein engineering.

   b) Explain C-DNA cloning and discuss its importance in eukaryotic gene manipulation.

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T.Y. B.Sc. (Vocational) (Semester – IV) Examination, 2011
ELECTRONIC EQUIPMENT AND MAINTENANCE
Paper – VI : Medical 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 log-tables or calculators is **allowed**.*

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

   i) Name any 2 body-surface recording electrodes.

   ii) What is meant by excitable cell ?

   iii) Which node in the heart is called 'pacemaker' ?

   iv) What is epilepsy ?

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

   i) REM sleep is paradoxical sleep.

   ii) No electrolyte gel is required for internal electrodes.

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

   i) Explain 'fibrillation' and 'defibrillation'.

   ii) State types of amplifiers in medical instrumentation.

2. Answer **any two** : **(2×4=8)**

   i) With block diagram explain 'basic recording system' in medical instrumentation.

   ii) Write a short note on direct writing ac recorder.

   iii) Explain specialized conduction system of heart.

P.T.O.

3. Answer **any two** : **(2×4=8)**

   i) Write standard features of normal EEG waves.

   ii) What are the requirements of micro-electrodes ?

   iii) Explain the principle of ion-selective electrodes.

4. Answer **any two** : **(2×6=12)**

   i) Explain how electric currents can affect human body.

   ii) Explain flame photometer.

   iii) Discuss anatomy of brain.

OR

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

   i) Discuss microshock hazards.

   ii) Explain blood-cell counter.

   iii) Write a short note on body-surface recording electrodes.

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