

+3, 1st SEMESTER EXAMINATION-2018 (SCIENCE)

Sub: STATISTICS

Full Marks: 60

Paper: CORE-I (Hons)

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

GROUP - A

1. (a) _____ scale assigns numbers or symbols to events in order to label them. [2x6]
- (b) What do you mean by parameter and statistic.
- (c) The standard deviation of 50 observation is 35. What should be the new standard deviation?
- (d) Find the standard deviation of $1 + 2 + 3 + \dots + n$
- (e) What do you mean by scalar matrix? Give an example
- (f) If $n_{p_1} = 12$, n_{p_2} , find n
- (g) In how many ways can 10 letters be posted in 5 letter boxes.
- (h) Define rank of matrix.

GROUP-B

Answer any FOUR of the following.

2. Define statistics. Explain its importance, functions, advantages and disadvantages. [12]
3. (a) Briefly explain parts of tabulation. [6+6]
 (b) The arithmetic mean of two observations is 127.5 and their geometric mean is 60. Find their harmonic mean and also find out the observations.
4. If $C_0, C_1, C_2, \dots, C_n$ denote the coefficient of the expansion of $(1+x)^n$, prove that [12]

(P.T.O...)

(a) $C_1 + 2C_2 + 3C_3 + \dots n.c_n = n.2^{n-1}$

(b) Find the term independent of x in the expansion of

$$\left(\frac{3}{5}x^2 - \frac{1}{2x}\right)^2$$

5. (a) Show that $A = \begin{pmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{pmatrix}$ is idempotent matrix [12]

(b) Prove that matrix multiplication is associative

6. (a) Show that the inverse of a symmetric matrix is symmetric. [12]

(b) Prove that the necessary and sufficient condition for a square matrix A to possess an inverse is that it is singular i.e. $|A| \neq 0$.

7. (a) Prove that the rank of sum of two matrices cannot exceed the sum of their ranks. [12]

(b) If A is an idempotent matrix

(ie) If $A^2 = A$ then $\rho(A) + \rho(I_n - A) = n$

8. (a) If $A^{-1} = \begin{pmatrix} 3 & 9 & 7 \\ 4 & 5 & 2 \\ -9 & 3 & -5 \end{pmatrix}$, find A [12]

(b) Show that the following systems of linear equation are consistent and solve

$$x + 2y - z = 3$$

$$3x + y + 2z = 1$$

$$2x - 2y + 3z = 2$$

+3, 1st SEMESTER END EXAMINATION-2018

(ARTS)

Sub.- HISTORY

PAPER : Core - I

Time: 3 Hours

Full Marks : 80

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

Section - 'A'

[2 x 8

1. Write brief notes on any EIGHT of the following.
 - a) What are the two great epics of Indian culture?
 - b) Who was the author of the book "*Rajtarangini*" and he belongs to which state?
 - c) Who wrote the book '*Harsha Charita*' and whose contemporary was he?
 - d) *Vishakhadutta* has written which famous book?
 - e) Which famous Chinese traveller visited India in Seventh Century and what were his books.
 - f) In which place the Indus Valley Civilisation had been discovered?
 - g) Where Harappa is situated?
 - h) Discuss the various classes of Vedic society.
 - i) Aryan Civilisation was based on which culture?
 - j) What was the position of Agni Debata ?
 - k) When Alexandar invaded India and when did the died?

Section - 'B'

Answer any FOUR questions.

2. Give an account of the sources of Indian History.
3. Describe the features of Mesolithic culture.
4. Describe the regional chronological distribution of Chalcolithic culture.
5. Narrate the salient features of Indus Valley Civilisation.
6. Give an account of the economic and social life of Harappan Civilisation.
7. Describe the society and economy during early Vedic period.
8. Give an account of life and teachings of Mahaveer Jain.



GACR
+3 1st SEMESTER EXAMINATION - 2018
(ARTS)
SOCIOLOGY (CORE - I)

Time : 3 Hours .

Full Marks : 80

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

GROUP - A

1. Answer any Eight of the following : (2x8)

- a) Give any two distinction between sociology and History.
- b) Mention two arguments of Formalistic school on scope of sociology.
- c) Write two features of culture.
- d) What is Ascribed status?
- e) What is in-group?
- f) What is Reference group?
- g) Write any two features of class.
- h) Write the name of two functionalist theorists on social stratification.
- i) What is Co-operation?
- j) What do you mean by Dis-associative social processes?

GROUP - B

(Answer any Four of the following) (4x16)

2. Describe the subject matter of Sociology.
3. How is Sociology related to political Science?

P.T.O.

(2)

4. Define community and discuss its elements.
5. Distinguish between primary and secondary group.
6. Define social mobility and discuss its determinants.
7. Describe the importance of Co-operation and assimilation as associative social processes.
8. Discuss Weber's theory on social stratification.



**+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)**

**Sub.- English
PAPER : Core - I**

Time: 3 Hours

Full Marks : 80

The figure in the right hand margin indicate marks.

Sec - 'A'

[4 x 6

Answer ALL questions

1. Describe the role of woman in 'The wife of Bath's' prologue and tale.

OR

What are the major themes of 'The wife of Bath'?

2. How does the Fool function within 'King Lear'?

OR

What role do women play in 'King Lear'?

3. Analyse the character of Abigail in 'The Jew of Malta'.

OR

Is 'The Jew of Malta' a revenge tragedy? Give your views.

4. Analyse any one of following poems :-

- a) Go, Lovely Rose.
b) Follow Thy Fair Sun, Unhappy Shadow.
c) Let me not to the marriage of true minds (sonnet)

Sec - 'B'

[14x4]

Answer ALL questions

1. Examine the wife's skill as a narration and storyteller in her prologue and tale.

OR

In what ways does Chaucer shape the reader's judgement of the wife?

2. How does King Lear portray the theme of 'age'?

OR

How king Lear be understood as morality play?

3. Barabas is both the oppressed and the oppressor, victim and villain? Can his evil action be justified?

OR

Discuss the theme of 'The Jew of Malta'.

4. Critically analyse any one of the following poems.
 - a) Song to Celia
 - b) Shall I compare thee to a summer's day? (Sonnet)
 - c) Leave, O Love, which reachest but to dust.



GACR
+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- HINDI (Hons.)
PAPER : C- I

Time: 3 Hours

Full Marks:80

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

1. निम्नलिखित प्रश्नों में से किन्ही **आठ** प्रश्नों के संक्षिप्त उत्तर दीजिए। [2x8]
- क) "द मडर्न वर्नाकुलार लिटरेचर ऑफ हिंदुस्तान" के लेखक का नाम लिखिए।
- ख) "हिन्दी साहित्य का आलोचनात्मक इतिहास" रचना किस की है?
- ग) 'पउम चरिउ' किस कवि की कृति है?
- घ) आदिकाल को चारणकाल किसने कहा?
- ङ) काव्य की प्रवृत्तियों के आधार पर पूर्वमध्यकाल का नाम उल्लेख कीजिए।
- च) आचार्य रामचंद्र शुक्ल ने कबीर की भाषा का नाम क्या रखा?
- छ) 'रामचतिरमानस' में कितने कांड हैं?
- ज) 'मधुमालती' का रचनाकार कौन है?
- झ) रीतिकालीन काव्य में किस रस की प्रधानता रही?
- ञ) रीतिमुक्त काव्यधारा के किसी प्रमुख कवि का नाम उल्लेख कीजिए।

2. निम्नलिखित प्रश्नों में से किन्हीं **चार** प्रश्नों के उत्तर दीजिए। [16x4]
- अ) हिंदी साहित्य के इतिहास ग्रंथों का परिचय प्रदान कीजिए।
- आ) जैन साहित्य के रचनाकार तथा उनकी रचनाओं की विशेषताओं पर प्रकाश डालिए।
- इ) निर्गुण काव्यधारा की प्रवृत्तियों की चर्चा कीजिए।
- ई) रामभक्ति शाखा के प्रमुख कवि तथा उनकी रचनाओं के महत्व का बर्णन कीजिए।
- उ) टिप्पणी लिखिए।
- i) भूषण के काव्य में राष्ट्रीय भावना
- ii) रीतिकालीन भक्ति एवं नीतिकाव्य
- ऊ) टिप्पणी लिखिए।
- i) सुफी प्रेमाख्यान काव्य
- ii) अष्टछाप
- ऊ) रीतिकालीन कविता की दरबारी तथा ऐतिहासिक पृष्ठभूमि का बर्णन कीजिए।



GACR
+3 1st SEMESTER EXAMINATION - 2018
(ARTS)
ODIA : Core - I

Time : 3 Hours

Full Marks : 80

Answer the Questions as per the instruction
The figure in the right hand margin indicate marks

(‘କ’ ବିଭାଗ) (ବାଧତାମୂଳକ)

(୨×୧୦)

୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଗୋଟିଏ ବା ଦୁଇଟି ବାକ୍ୟରେ ଲେଖ ।

୧. (କ) ଚର୍ଯ୍ୟାକାରମାନଙ୍କ ମଧ୍ୟରେ ଆଦି ସିଦ୍ଧାନ୍ତର ଧର୍ମ କିଏ ?
- (ଖ) ‘କାଆ ତରୁବର ପଞ୍ଚ ବି ତାଳ’ – ଏହାର ଅର୍ଥ କ’ଣ ?
- (ଗ) ଚର୍ଯ୍ୟାଗୀତିକା ସହିତ ହରପ୍ରସାଦ ଶାସ୍ତ୍ରୀଙ୍କ ନାମ କହିଁକି ଯୋଡ଼ାଯାଏ ?
- (ଘ) ସାରଳା ଦାସଙ୍କୁ ‘ଶୁଦ୍ରମୁନି’ କହିବାର ତାତ୍ପର୍ଯ୍ୟ କ’ଣ ?
- (ଙ) ସାରଳାଙ୍କ କେଉଁ ରଚନାରେ ମହିଷାସୁର ବଧ ପ୍ରସଙ୍ଗ ବର୍ଣ୍ଣନା କରାଯାଇଛି ?
- (ଚ) ‘ଶ୍ରୀ ଭାରତ ଦର୍ପଣ’ ଗ୍ରନ୍ଥର ରଚୟିତା କିଏ ?
- (ଛ) ‘ପଞ୍ଚସଖା’ କବିମାନଙ୍କର ନାମ ଉଲ୍ଲେଖ କର ।
- (ଜ) ‘ଜଗମୋହନ ରାମାୟଣ’ର ଏପରି ନାମକରଣ କାହିଁକି ହୋଇଛି ?
- (ଝ) ଶ୍ରୀଚୈତନ୍ୟ ଦେବ କେବେ ଶ୍ରୀକ୍ଷେତ୍ର ଆଗମନ କରିଥିଲେ ?
- (ଞ) ‘ସଖାହୀନ ପଞ୍ଚସଖା’ ଗ୍ରନ୍ଥ କିଏ ରଚନା କରିଛନ୍ତି ?
- (ଟ) ‘ମୃଗୁଣୀ ସ୍ତୁତି’ କେଉଁ କବିଙ୍କର ରଚନା ?
- (ଠ) ଅରୁଣାଚାର୍ଯ୍ୟଙ୍କ ‘ହରିବଂଶ’ କାହିଁକି ‘ସାତଖଣ୍ଡିଆ ହରିବଂଶ’ ଭାବରେ ପ୍ରସିଦ୍ଧି ଅର୍ଜନ କରିଛି ?

(୨)

‘ଖ’ ବିଭାଗ

(ସମସ୍ତ ଦୀର୍ଘ ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅ)

୨. ଚର୍ଯ୍ୟାଗାତିକାରେ ପ୍ରତିଫଳିତ ସାମାଜିକ ଜୀବନର ଚିତ୍ର ବର୍ଣ୍ଣନା କର । (୧୨)

ଅଥବା

ଓଡ଼ିଆ ନାଥ ସାହିତ୍ୟ ସମ୍ପର୍କରେ ଏକ ସ୍ଥୂଳ ପରିଚୟ ଦିଅ ।

୩. ସାରଳା ଦାସଙ୍କ ରଚନା ସମ୍ଭାରର ସାହିତ୍ୟିକ ମୂଲ୍ୟ ନିରୂପଣ କର । (୧୨)

ଅଥବା

ମହାଭାରତକୁ ଅବଲମ୍ବନ କରି ସାରଳା ଦାସଙ୍କ ଧର୍ମ ମତର ପରିଚୟ ଦିଅ ।

୪. ପଞ୍ଚସଖା ସାହିତ୍ୟର ପୃଷ୍ଠଭୂମି ଆକଳନ କର (୧୨)

ଅଥବା

ବଳରାମ ଦାସଙ୍କ ଜୀବନୀ ଓ କୃତିତ୍ୱ ସମ୍ପର୍କରେ ଏକ ଆଲୋଚ୍ୟ ପ୍ରବନ୍ଧ କର ।

୫. ଜଗନ୍ନାଥ ଦାସଙ୍କ ଭାଗବତର ସାହିତ୍ୟିକ ମୂଲ୍ୟ ନିରୂପଣ କର । (୧୨)

ଅଥବା

ପଞ୍ଚସଖା ସାହିତ୍ୟର ଆଧ୍ୟାତ୍ମିକ ବିଶେଷତ୍ୱ ଦର୍ଶାଅ ।

୬. ପଞ୍ଚସଖା ସାହିତ୍ୟରେ ଶ୍ରୀଜଗନ୍ନାଥ ଧର୍ମ ଦର୍ଶନର ପ୍ରତିଫଳନ ବର୍ଣ୍ଣନା କର । (୧୨)

କର ।

ଅଥବା

ପଞ୍ଚସଖା ସାହିତ୍ୟ ଆଧାରରେ ଓଡ଼ିଆ ସଂସ୍କୃତିର ଚିତ୍ର ପ୍ରଦାନ କର ।



GACR
+3 1st SEMESTER EXAMINATION - 2018
(ARTS)
POLITICAL SCIENCE (CORE - I)

Time : 3 Hours

Full Marks : 80

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

SECTION - A

1. Answer any Eight of the following : (2x8)

- a) Two dimention of political theory.
- b) Positive view of politics.
- c) Philosophical approach.
- d) System approach.
- e) Liberal feminism.
- f) Liberal democracy.
- g) Indirect democracy.
- h) Referendum.
- i) Deliberative democracy.
- j) Universal Adult franchise.

SECTION - B

Answer any Four

2. What is political theory? Discuss five main streams of political theory. (16)

OR

Analyse the sailent features of marxian theory of State.

3. Critically examine the Anarchist political theory. (16)

OR

P.T.O.

(2)

Examine the features of conservative political theory.

4. Critically analyse legal institution approach. (16)

OR

Examine David Easton's behavioural approach.

5. Discuss the features of Radical Feminism. (16)

OR

Analyse the features of Post-Modernism.

6. Examine the salient features of liberal democracy. (16)

OR

Discuss various devices of direct democracy.

7. Discuss the Merits and Demerits of democracy. (16)

OR

Analyse various condition essential for the successful working of Democracy.

8. Critically analyse the features of participatory democracy. (16)

OR

What is direct election? Discuss its Merits and Demerits.



No. of Pages: 2

GACR
+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- Psychology
PAPER : Core - I

Time: 3 Hours

Full Marks:60

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

Group - 'A'

[2 x 6

1. Write brief notes on any SIX of the following.
- a) Psychology as a scientific discipline
 - b) Socio-cultural perspective
 - c) Independent variable
 - d) Hypothalamus
 - e) Synapse
 - f) Altered state of consciousness
 - g) Hypnosis as a technique of psycho analysis.
 - h) Phenylketonuria

[P.T.O.]

Group - 'B'

[12x4]

Answer any FOUR long type questions given below.

2. Briefly explain the historical development of contemporary psychology.
3. Give a modern definition of psychology. Discuss the cognitive and humanistic perspectives in understanding modern psychology.
4. What is survey method? Discuss the advantages and disadvantages of survey method.
5. Discuss the importance of Endocrine glands in behaviour.
6. Write about the structure and functions of Autonomic Nervous system.
7. State the concept and nature of hallucination. Discuss the different forms of hallucination.
8. Write short notes on:
 - a) Sleep - Wake schedule
 - b) Meditation
9. Write short notes on:
 - a) Basic principles of genetics
 - b) Huntington's disease.



**+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)**

Sub: ZOOLOGY

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Give suitable labelled diagrams wherever necessary.

GROUP - A

[2x6]

1. Write short notes any SIX of the following.

- (a) Explain the pathogenecity, treatment and prevention of *plasmodium* species?
- (b) What is the importance of canal system in sponges?
- (c) What is polymorphism?
- (d) Mention the economic importance of *Taenia*?
- (e) What is Elephantiasis?
- (f) Explain the mechanism of Flagellar movement.
- (g) What is the reason of inclusion of Euglena in the animal kingdom?
- (h) How do *ctenophores* differ from other coelenterates?

GROUP-B

Answer any FOUR questions.

2. Describe the life-cycle and pathogenecity of *Entamoeba*. [12]
3. Describe different types of canal system in sponges. [12]
4. What is alternation of generation? Explain it with reference to the life-history of *Obelia*. [12]

(P.T.O...)

[2]

5. Describe parasitic adaptation of *Fasciola*? [12]
6. Give distinguishing features of phylum-Nematoda. [12]
Classify upto classes giving characters and examples.
7. Describe the life-cycle and pathogenicity of *Ascaris*. [12]
8. Write short notes on any TWO of the following. [6x2]
- (a) Characters of phylum Protozoa.
 - (b) Coral reefs
 - (c) Parasitic adaptation of *Wuchereria*.
 - (d) Evolutionary significance of Ctenophora.

- x - x - x -

**+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)**

Sub: COMPUTER SCIENCE

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Section-A is compulsory. Answer any four from Section-B

SECTION-A

[2x6]

1. Answer any SIX questions.

- (a) State the rules of define an identifier.
- (b) Describe how ternary operator works.
- (c) Define array and describe its memory allocation technique.
- (d) Differentiate constant and variable
- (e) State about the jump statements in 'C'?
- (f) List the bitwise operators. Describe them with examples.
- (g) State the advantage of union over structure.
- (h) What do you mean by Dynamic Memory Allocation?

SECTION-B

2. (a) Describe different types of storage classes available in 'C'. [6]
- (b) Give brief description of 'C' tokens. [6]
3. (a) Describe different loop structures used in 'C' with syntax and examples. [6]

(P.T.O...)

- (b) Define character array. Write a program to count the vowels of a given string. [6]
4. (a) Define structure. Write a program to illustrate array within structure. [6]
- (b) Define recursion. Using recursion find the factorial of a given no. [6]
5. (a) Describe array of pointers, support your answer with suitable example. [6]
- (b) Write a program using pointers to swap two given nos. [6]
6. (a) Using command line argument, write a program to find the sum of given nos. [6]
- (b) Describe the functions used for I/O operators in file processing with syntax. [6]
7. (a) Write a program to sort an integer array of size 10 in descending order. [6]
- (b) Write a program to add two complex numbers using UDF. [6]
8. Write short notes on the following (Any THREE) [3x4]
- (a) File opening modes
- (b) malloc () and calloc ()
- (c) Structure vs Array
- (d) Actual argument and formal argument

+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)

Sub: CHEMISTRY

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

GROUP - A (Compulsory)

[2x6]

1. Answer any SIX questions.

- (a) Write significance of ψ and ψ^2 .
- (b) Write the values of all the quantum numbers of the outer most electron of Copper.
- (c) What are isoelectronic ions? Give one example.
- (d) Define Radius Ratio.
- (e) NF_3 has less dipole moment than NH_3 , Why?
- (f) Can non polar molecule have polar covalent bond?
Explain
- (g) What is the hybridisation and shape of ClF_3 molecule?
- (h) What is disproportionation reaction. Give example.

GROUP - B

Answer any FOUR questions

- 2. (a) What is Schrodinger Wave equation? Derive it and explain its significance. [8]
- (b) Write notes on Heisenberg's uncertainty principle. [4]
- 3. (a) What is quantum number? Explain about all the quantum numbers. [8]

(P.T.O...)

[2]

- (b) Derive de Broglie's equation. Show that it supports Bohr's theory. [4]
- 4 (a) Describe about main features of Long form of periodic table. [10]
- (b) Give the relation of Mulliken's method of determination of electronegativity. [2]
5. Write notes on [4x3]
- (a) Ionisation enthalpy
- (b) Covalent Radii
- (c) Shielding effect
6. (a) What is lattice energy? Explain the importance of Madelung Constant? [2+6]
- (b) Discuss the packing of ions in crystals with special reference to CsCl? [4]
7. (a) What is hybridisation? Mention different types of hybridisation. Explain structure of PCl_5 and IF_7 , with the help of hybridisation concept. [10]
- (b) What is their Bond order and magnetic character of oxygen molecule? [2]
8. (a) What are semiconductors? Explain what is meant by n-Type and p-type Semiconductor? [8]
- (b) Explain the term single electrode potential. How is this measured? How do we assign a negative or a positive sign to electrode potential? Represent a standard hydrogen electrode. [4]

+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)

Sub: ETC

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Question No. 1 is compulsory and any FOUR from the rest 7 questions

1. Answer any SIX questions.

[2x6]

- (a) Distinguish between intrinsic semiconductor and extrinsic semiconductor.
- (b) What is static and dynamic resistance?
- (c) Write the applications of tunnel diode.
- (d) What is Schottky diode?
- (e) Establish a relation between alpha and beta parameter.
- (f) What are the advantages of negative feedback circuits?
- (g) Convert, $(11111.11)_2$ to decimal number.
- (h) Outline the rules of Boolean Algebra.

2. What is a P-N junction? Explain the operation of P-N junction diodes. Write V-I characteristics of a P-N junction diode.

[12]

3. (a) Distinguish between n-type and p-type semiconductor.

[6]

(b) Explain filter circuit. Write its advantages.

[6]

4. What is Zener diode? Outline its characteristics. Discuss the applications of Zener diode as voltage regulator.

[12]

(P.T.O...)

5. Write notes on:
- (a) Operation of NPN and PNP transistor. [6]
 - (b) BJT as an amplifier and as a switch. [6]
6. Briefly discuss the four basic feedback topologies. [12]
7. (a) Draw the logic circuit for $(\overline{A + B})(C + D)\overline{C}$ [6]
- (b) Convert $(1717.1717)_{10} = (\quad)_2$. [6]
8. Write short notes on:
- (a) AND, OR, NAND, NOR logic gates [6]
 - (b) DeMorgan's Theorem. [6]

**+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)**

Sub: BOTANY

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

GROUP - A (Compulsory)

1. Write short notes: any SIX of the following. Each in 3 to 5 sentences. [2x6]

- (a) Viroids
- (b) Archaeobacteria
- (c) Spheroplast
- (d) F.E. Fritsch
- (e) Diatomite
- (f) Cystocarp of Polysiphonia
- (g) Chantransia stage
- (h) Viruses in vaccine production

GROUP-B

Answer any FOUR questions.

- 2. Discuss different types of genetic recombination in bacteriophage (Lytic and Lysogenic cycles) [12]
- 3. Describe various methods of reproduction in bacteria. [12]
- 4. Give an account of major photosynthetic pigments found in algal and their distribution in different algal groups. [12]

(P.T.O...)

[2]

5. What is isomorphic alternation of generation? Describe its significance in the life history of ectocarpus. [12]
6. Describe the morphology and life cycle of Oedogonium. [12]
7. Write short notes on: [6x2]
- (a) Baltimore's Classification
 - (b) Economic importance of bacteria
8. Write short notes on: [6x2]
- (a) Flagellation in algae
 - (b) Heterocyst

- x - x - x -

**+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)**

Sub: MTC (Math)

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Answer any SIX questions from Q. No.1 and

any FOUR from the rest.

1. (a) Find the asymptotes to the curve $y = \tan x$ [2x6]

(b) Solve $\lim_{x \rightarrow 0} \frac{1 - \cos 3x}{x^2}$ using L-hospital rule.

(c) Find the radius of curvature of a straight line.

(d) Find the point of inflexions for the curve

$$f(x,y) = x^2 - 6xy + 2y^2$$

(e) State the reduction formula of $\int \sin nx \cdot dy$.

(f) State the general equation of cylinder.

(g) Define right circular cone.

(h) Define scalar triple product of three vectors.

2. (a) Find the maximum and minimum values of [6]

$$f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$$

(b) If $V = \cos 3x \cos 4y \sin n 5z$, then prove that [6]

$$\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2} = 0$$

3. (a) Find the asymptotes parallel to co-ordinate axes for the curve $x^2y^2 - a^2y^2 - b^2x^2 + 2xy - 3y + 1 = 0$ [2] [6]

(b) Find the radius of curvature to the curve $y^2 = 2x(3-x^2)$ [6]

4. (a) If $y = x^2 \sin x$, then find the nth derivative of y using Leibnitz rule. [6]

(b) Trace the curve $y = (x + 2)(x - 3)$ [6]

5. (a) Evaluate $\int_0^{\pi/3} \cos^5 x \cdot dx$ using reduction formula. [6]

(b) Find the arc length of the curve $r = a(1 + \cos \theta)$, $0 < \theta < \pi/3$ [6]

6. (a) Find the surface area in the first octant cut from the cylindrical surface $x^2 + y^2 = a^2$ by the plane $z = x$. [6]

(b) Evaluate $\lim_{x \rightarrow y} \frac{\cos^2 x - \cos^2 y}{x^2 - y^2}$ [6]

7. (a) Find the equation of cone whose vertex is at origin [6]

and guiding curve is $\frac{x^2}{9} + \frac{y^2}{4} + z^2 = 1,$

$x + 2y + 3z = 6.$

(b) A particle moves along the curve [6]

$\vec{r} = (t^3 + 2t)\hat{i} + (t^2 + 7t)\hat{j} + (4t^2 + 2t^3)\hat{k}$. Where t denotes the time. Find the magnitude of acceleration along the tangent and normal.

8. (a) Prove that $\nabla^2(r^n) = n(n+1)r^{n-2}$ [3] [6]

(b) Evaluate the line integral $\int_c (y^2 dx - 2x^2 dy)$ [6]

where c : the parabola $y = x^2$ from $(0, 0)$ to $(2, 4)$

- x - x - x -

[4]

7. Write short notes on:

- Perpetual inventory system
- Revaluation account
- Partnership deeds
- Methods of valuation of good will

[4x4]

8. A, B and C were equal partners in a firm and the Balance sheet as at July 1, 2016 was produced by them.

[16]

	Rs.		Rs.
Creditor	33,000	Goodwill	1,19,000
Bills payable	60,000	Building	1,95,000
Capital A/Cs:		Furniture	24,000
A	2,17,000	Stock	1,14,000
B	1,66,000	Debtors	1,08,000
C	90,000	Cash	6,000
	5,66,000		5,66,000

On July 1, 2016 they agreed to take D as an equal partner on the following terms:

- D should bring in Rs 1,50,000 as his capital and good will was evaluated at Rs. 50,000.
- The goodwill account is to be written off before admission.
- Provision for loss on stock and provision for debtors was to be made at 10 and 5 percent respectively.
- The value of Building was to be taken at Rs. 2,70,000.
- The capital of the new firm was fixed Rs. 4,00,000 and the partner's account to be in their profit sharing ratios, any excess is to be transferred to current account or deficit to be introduced in cash.

You are required to prepared the Revaluation Account, Capital Accounts and the Balance Sheet of the new firm.

- x - x - x -

No. of Pages: 4

GACR

**+3, 1st SEMESTER EXAMINATION-2018
(COMMERCE)**

Sub: Fin. Accounting

Full Marks: 80

Paper: CORE-I

Time: 3 Hours

*Answer the questions as per instruction.**The figure in the right hand margin indicate marks.**Q-1 is compulsory. Answer any four from Q-2 to 8.*

1. Answer any EIGHT.

[2x8]

Write short notes on:

- Dual aspect concept
- Journal proper
- Amortization
- Stores ledger
- Capital receipts
- Operating lease
- Fictitious assets
- Inter-branch transfers
- Goodwill
- Joint life policy

Answer any FOUR questions.

2. Define financial accounting. Discuss the accounting principles in detail.

[16]

3. Write short notes on

- Accounting is an information systems.
- Branches of accounting
- Cash basis and accrual basis of accounting
- Adjusted trial balance

[4x4]

4. On 1st January, 2003, machinery was purchased by X for Rs. 50,000. On 1st July, 2004 additions were made to the extent of Rs. 10,000. On 1st April, 2005, further additions were made to the extent of Rs. 6,400.

[16]

(P.T.O...)

[2]

On 30th June, 2006 machinery, the original value of which was Rs. 8,000 on 1st January, 2003, was sold for Rs. 6,000. X closes his books on 31st December each year. Show the machinery account for the years from 2003 to 2006 in the books of X if depreciation is charged @ 10% at

- (i) Original Cost Method
(ii) Diminishing Balance Method

5. From the following trial balance, prepare Trading, Profit & Loss Account for year ended 31st March, 2018 and a Balance Sheet as at that date taking into consideration the following adjustments: [16]

1) Closing Stock Rs. 9,500 (2) One Quarter of insurance premium falls in next year. (3) Provide 10% depreciation on furniture. (4) Loan to X carries 8% interest p.a. (5) Loan from Y carries 6% interest p.a. (6) Goods worth Rs 500 have been taken by the proprietor for private use. (7) Provide 5% for bad and doubtful sum credits (8) Salaries include salary to proprietor @ Rs 200 per month.

Debit Balance	Rs.		Rs.
Stock 1.4.2017	6,000	Debtors	30,000
Salaries	6,000	Advertisement	3,000
Drawings	6,000	Bad Debts	500
Carriage Inward	1,000	Discount	600
Carriage Outward	500	Cash	200
Return Inwards	800	Furniture	3,000
Loan to X	3,000	Goodwill	5,000
Rent	1,200	Wages	100
Purchases	60,000	Insurance Premium	600
		Bank	8,500
Credit Balances:		Rs	
Capital		40,000	

[3]

Return O/W	500
Loan from Y	5,000
Rent Outstanding	100
Creditors	13,000
Liabilities for other expenses	1,900
Provision for Bad Debts	1,000
Discount	300
Sales	73,700
Rent Sub-letting	500

6. Mussers Eastern Traders, Delhi opened a branch at Bhubaneswar on 1.7.2017. The goods were sent by the head office to the branch invoiced at selling price of the branch which was 125% of the cost price of the head office. The following are the particulars relating to the transactions of Bhubaneswar Branch: [16]

Goods sent to Branch (at cost)	2,80,800
Sales Cash	1,25,000
Credit	1,75,000
Cash collected from Debtors	1,56,000
Discount Allowed	4,000
Goods returned by debtors to branch	5,000
Spoiled cloth in bales written off at invoice price	500
Cash sent to branch for	
Salaries	3,000
Freight	11,000
Other expenses	6,000
	20,000
Stock on 30th June 2018 at invoice price	55,500

Ascertain the profit or loss for the Bhubaneswar Branch for the year ended 30.06.2018 by preparing account under stock and Debtors system.

(P.T.O...)

No. of Pages: 3

GACR
+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- Education
PAPER : Core - I

Time: 3 Hours

Full Marks:60

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

Group - 'A'

[2x6]

1. Answer any SIX objective type questions within three to four sentences each.
 - i) What is cultural aim of education?
 - ii) What does the branch of philosophy metaphysics deal with?
 - iii) Explain dvaita Vedanta.
 - iv) Why is pragmatic school of philosophy is known as experimentalism.
 - v) What is the meaning of nature in Rousseau's educational policy?
 - vi) Write any two methods of teaching advocated by John Dewey.
 - vii) What do you mean by craft centred education?
 - viii) What is vital education as advocated by Sri Aurobindo?

[P.T.O.]

Group - 'B'

Answer any FOUR long type questions given below.

2. Discuss the individual and social functions of education. [6+6]

OR

Write short notes on the following: [6+6]

- a) Explain what education is and what education is not?
 b) Critically examine the individual aim of education.
3. Explain how philosophy influences various aspects of education. [12]

OR

What does epistemology deal with? Discuss the implications of epistemology for education. [4+8]

4. What is *Sankhya* philosophy? Discuss the educational implication of *Sankhya* School of philosophy. [3 +9]

OR

Explain in your own words the points of similarities and differences between *Sankhya* and *Vedanta* philosophy. [6+6]

5. What is pragmatism? Explain the aims of education, Curriculum and methods of teaching according to pragmatism. [3 +9]

OR

[3+3+3+3]

Give a comparative study of idealism and naturalism from the aspects of principles and aims of education, curriculum and methods of teaching.

6. What are the salient features of Sri Aurobindo's integral education? [12]

OR

Write a detailed note on the influence and contribution of John Dewey towards modern education.



No. of Pages:3

GACR
+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- Philosophy
(PAPER : Core- I)

Time: 3 Hours

Full Marks:80

The figure in the right hand margin indicate marks.
Question No.1 is compulsory, answer any FOUR from the rest.

Group - 'A'

[2x8]

1. Answer any EIGHT of the following.
 - i) What do you understand by ideogram in symbolic logic?
 - ii) What is a singular proposition?
 - iii) State one of the de Morgan's rules.
 - iv) Which term in a syllogism is said to be the middle term?
 - v) What is a bound variable?
 - vi) Find out the Logical structure of Centours exist by using existential Quantifiers.
 - vii) State the four different types of propositions used in Aristotelian syllogism.
 - viii) State the valid moods of 1st figure.
 - ix) State the rule of Detachment.
 - x) What are propositional variables. Give examples.

[P.T.O.]

Group - 'B'

[16x 4]

Answer any FOUR questions.

2. What is logical form? Why does the validity of the argument depends on its form? Explain.
3. Construct Truth Tables for the following. Which of them are tautologies?
 - i) $(p \supset q) \supset (\sim q \supset \sim p)$
 - ii) $(p \cdot q) \supset (p \vee q)$
4. Reduce the following formulae to equivalent conjunctive normal form.
 - i) $((p \supset q) \cdot \sim q) \supset \sim p$
 - ii) $((p \supset q) \cdot (q \supset \sim r)) \supset (q \supset \sim r)$
5. Test the validity of the following by short truth table method.
 - i) $(p \supset q) \supset (\sim p \supset \sim q)$
 - ii) $((p \cdot q) \supset r) \supset (p \supset (q \supset r))$
6. Test the validity of the following by Equivalent substitutions
 - i) a) $p \supset \sim(Q \cdot R)$
 - b) $S \supset Q$
 - c) $Q \supset R$
 - d) S

$\therefore \sim p$.

- ii) a) $(P \vee Q) \supset R$
- b) $\sim R$
- $\therefore \sim Q$.
7. Put the following Boolean expressions in normal form.
 - i) $AB' + A'$
 - ii) $AB + A'C + C'$
8. Test the validity of the following by the method of Boolean Algebra of classes.
 - a) No. Scientists are fanatics.
Some politicians are fanatics.
 \therefore Some politicians are not scientists.
 - b) Some tax payers are voters.
All voters are citizens
 \therefore Some citizens are tax payers.



No. of Pages: 3

GACR
+3, 1st SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- Economics
PAPER : C - I

Time: 3 Hours

Full Marks:80

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

1. Answer any EIGHT of the following. [2x8]
- Why does problem of Scarcity exist?
 - What does the phrase “ People make marginal dicision”, mean?
 - On which factory the quantity that a consumer plans to buy depend upon?
 - If the demand is fixed but supply of the product increases, what happens to equilibrium price and quantity?
 - Why indifference curves do not intersect ?
 - What do you mean by “Budgetline”?
 - Why the long run average cost a curve (LAC) is referred to as a planning horizon?
 - What is true of marginal cost when marginal returns are increasing ?
 - On what day the amount of time an individual is wishing to offer for a wage, depend?
 - What factory influence the demand for labour ?

[P.T.O.]

Answer any **FOUR** questions from the following.

2. A) To study economic problems, economists usually employ a process of theoretical investigation, called the scientific method which consist of four steps. Explain each of these steps. [10]
- B) (i) Why is the concept of scarcity important to the definition of economics? [3+3]
- ii) Which problem of an economy constitute the subject matter of micro-economics?
- 3.(A) What are the factors that cause the demand curve to shift illustrate graphically? [10]
- (B) Distinguish between:
- (i) Elasticity of demand and Elasticity of supply. [3+3]
- (ii) Point price elasticity of demand and Arc price elasticity of demand.
4. (A) State and Explain the exceptions to the law of demand. [10]
- (B) Distinguish between the following on the basis of elasticity of demand. [3+3]
- i) Normal goods and inferior goods.
- ii) Complements and substitutes.
5. A) With the help of suitable diagrams, explain all the factors of indifference curve. [10]
- (B)(i) What is meant by "Rationality in the household decision making process"? [3+3]
- ii) What do you meant by "Consumer Surplus"?

6. A) What is the relationship between the firm's shortrun production function and its fixed and variable costs? [10]
- (B) (i) What kinds of Govt. regulations and designed to alter or control firm's behaviour?
- ii) When production by a monopoly would result in the socially optional allocation of resources? [3+3]
7. (A) "No monopolist would ever fix the output of its poroduct at a level where the elasticity of the AR curve is less than one" Discuss. [10]
- (B)(i) Why variable cost are called prime costs? [3+3]
- ii) How can AVC be expressed ?
8. (A) Why might permanent wage differences occur between different markets for labour or within the same labour market? [10]
- (B)(i) Which factors govern the supply of labour? [3+3]
- (ii) Why the supply of land is independent of what is earns ?



GACR
+3 1st SEMESTER EXAMINATION - 2018
(SCIENCE)
PHYSICS (GE - I)

Time : 3 Hours

Full Marks : 60

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - 'A' (Compulsory)

1. Answer any Six of the following:
- (a) Find the constant P for which $\vec{A} \times \vec{B} = \vec{C}$ (2)
- Where $\vec{A} = \hat{i} + 2\hat{k}$, $\vec{B} = \hat{i} + p\hat{j} - \hat{k}$ and $\vec{C} = -2\hat{c} + 3\hat{j} + \hat{k}$
- (b) Solve $(1 - x^2)(1 - y) dx = xy(1 + y) dy$. (2)
- (c) Define Inertial and non-Inertial frame of reference. (2)
- (d) Find the torque of force $\vec{F} = (-\hat{i} - 3\hat{j} + \hat{k})N$ (2)
about a point 0 (1m, 1m, 1m) when the force acts at a point 'P' (2m, 3m, 4m).
- (e) State Kepler's laws of planetary motion. (2)
- (f) What are the basic ideas of global positioning system (GPS). (2)
- (g) Derive the average value of kinetic energy in S.H.M. (2)
- (h) At what displacement the kinetic and potential energies are equal. in S.H.M. (2)

(2)

Group - 'B'

2. Answer any FOUR questions.

(a) If $\vec{A} = \hat{i} - \hat{j} - 2\hat{k}$, $\vec{B} = 3\hat{i} + 5\hat{j} + 6\hat{k}$, $\vec{C} = -\hat{i} + 4\hat{j} + m\hat{k}$, (6)

Determine m such that

- (i) All the three vectors are coplanar.
- (ii) The volume of the parallelepiped made by them be 12 units.

(b) If $\vec{A} = 4\hat{i} + 5\hat{j} + 3\hat{k}$, $\vec{B} = 2\hat{i} + 10\hat{j} - 7\hat{k}$, and (6)

$\vec{C} = 5\hat{i} + 7\hat{j} - 4\hat{k}$, deduce the values of :

(i) $\left(\vec{A} \times \vec{B} \right) \cdot \vec{C}$ and (ii) $\vec{A} \times (\vec{B} \times \vec{C})$

3. (a) Derive the relation between angular momentum (\vec{L}) (6)

and angular momentum about centre of mass (\vec{L}_{cm})

(b) Derive the relation between angular momentum and torque. Express the angular momentum in terms of components. (6)

4. What is Damped oscillation. Derive the eqⁿ of Damped harmonic oscillator by discussing the three different cases. (12)

5. (a) Obtain the relationship among the elastic constants. (8)

(b) Determine the work done in a twisting wire. (4)

(3)

6. (a) Define S.H.M. show that the sum of average of kinetic energy and potential energy is equal to total energy in S.H.M. (8)

(b) If the relaxation time of a damped harmonic oscillator is 100 second Find the time in which (a) amplitude falls to 1/e times of the initial value (b) energy of the system falls to 1/e times of initial value. (4)

7. (a) Write the postulates of special theory of Relativity. Derive the lorentz transformation equations and inverse transformations. (8)

(b) Prove that the wave eqn. $x^2 + y^2 + z^2 - c^2 t^2 = 0$ is invariant under Lorentz transformation. (4)

8. (a) Write short notes on (8)

(i) Length contraction

(ii) Time diatoon.

(b) A rod of length 1 metre moves along its length with a velocity 0.6C. Find its length as if appears to an observer on earth and moving with the rod. (4)



+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)

Sub: PHYSICS
Paper: CORE-I

Full Marks: 60
Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

1. (a) Find the integrating factor (I.F) of $L \frac{di}{dt} + RI = E$. [2x10]
- (b) $\int_{-\infty}^{\infty} \delta(x-a)\delta(x-b)dx = ?$ Fill the blank.
- (c) A vector under rotation is given by $\vec{r}' = R(\theta)\vec{r}$.
- (d) \vec{F} is a vector field and it is a conservative force field.
Find $\vec{\nabla} \times \vec{F}$
- (e) If \vec{r} is a position vector in 3D, then what is the value of $\text{grad } \frac{1}{r}$.
- (f) What is a base vector in curvilinear co-ordinates?
- (g) Find the surface integral $\iint_s \vec{F} \cdot d\vec{s}$ if surface \vec{s} encloses volume V^s
- (h) State stoke's theorem in plane.
- (i) Integrate $\int_0^1 \int_0^1 \vec{F} \cdot d\vec{l}$ along the path $y = x^2$ for $\vec{F} = x\hat{i} + y\hat{j}$
- (j) If $u = x^2y$, where $x^2+xy+y^2=1$, Find $\frac{du}{dx} = ?$

(P.T.O...)

[2]

2. (a) Define Dirac delta function. [2]

(b) Show that $\delta(a^2 - x^2) = \frac{1}{2|a|}[\delta(a-x) + \delta(a+x)]$. [3](c) Starting from $\delta(x) = \int_{-\infty}^{\infty} e^{ikx} dk$, show that [3]

$$\delta(x) = \lim_{\sigma \rightarrow \infty} \left(\frac{\sin \sigma x}{\pi x} \right).$$

OR

(a) How can you make an inexact differential it exact differential? [2]

(b) Integrate the differential

$$dz = (8e^{4x} + 2xy^2)dx + (4 \cos 4y + 2x^2y) dy$$
 using the exact of differentials. [6]

3. (a) What is a scale factor in curvilinear co-ordinates. [2]

(b) Derive the expression for $\nabla^2 \phi$ in spherical polar co-ordinates. [6]

OR

Derive the expression for velocity and acceleration in spherical polar-co-ordinates. [3+5]

4. (a) Discuss the co-ordinate transformation under rotation [4]

 in 3D and show that $x_i^1 = \sum_{j=1}^3 a_{ij} x_j$ and $\sum_{k=1}^3 \delta_{ik} \delta_{jk}$
for $i, j = 1, 2, 3$.

(b) Show that the dot product of two vectors under rotation is invariant [4]

[3]

OR

(a) Show that $\vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b}) = 0$. [3](b) $[\vec{b} \times \vec{c}, \vec{c} \times \vec{a}, \vec{a} \times \vec{b}] = [\vec{a} \vec{b} \vec{c}]^2$ [3](c) Explain geometrical meaning of $\vec{a} \times (\vec{b} \times \vec{c})$ [2]5. (a) Prove that $\vec{\nabla} \cdot (\vec{A} \times \vec{B}) = \vec{B} \cdot \vec{\nabla} \times \vec{A} - \vec{A} \cdot \vec{\nabla} \times \vec{B}$ [4](b) Prove that $\vec{\nabla} \times \vec{\nabla} \times \vec{A} = \vec{\nabla}(\vec{\nabla} \cdot \vec{A}) - \nabla^2 \vec{A}$ [4]

OR

Derive the expression for curl in spherical and cylindrical polar co-ordinates. [4+4]

6. (a) State and explain stokes theorem in 3D and reduce it in X-Y- plane (Green's theorem) [3+2]

(b) Verify stoke's theorem in plane for $\oint_c (xy + y^2) dx + x^2 dy$, where c is a closed curve of region bounded by $y=x^2$ and $y=x$. [3]

OR

Evaluate $\iiint_v (\nabla \cdot \vec{F}) dv$, where v = volume enclosed region bounded by the planes $x=0, y=0, z=0$ and $2x + 2y + z = 4$ for vector $\vec{F} = (2x^2 - 3z)\hat{i} - 2xy\hat{j} - 4x\hat{k}$ [8]

- x - x - x -

**+3, 1st SEMESTER EXAMINATION-2018
(SCIENCE)**

Sub: MATHEMATICS

Full Marks: 60

Paper: CORE-I

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Answer any SIX questions from Q. No.1 and

any FOUR from the rest.

1. (a) Find the asymptotes to the curve $y = \operatorname{cosec} x$

[2x6]

(b) Evaluate $\lim_{x \rightarrow 0} \frac{2 \tan x + x}{3x + 2x^2}$

- (c) Write down the formula for radius of curvature in polar form.

(d) If $y = x \cdot \sin x$, then find $\frac{d^n y}{dx^n} = ?$.

(e) if $\vec{A} = t^2 \hat{i} - t \hat{j}$, $\vec{B} = 2t \hat{j} + 5t^2 \hat{k}$,

$\vec{C} = 3t \hat{i} + 2t^2 \hat{k}$ then find $\frac{d}{dt} [\vec{A} \vec{B} \vec{C}]$

(f) Evaluate $\int_0^{\pi/3} \sin^3 t \cdot \cos t \, dt$

- (g) Write down polar equation for sphere.

(h) Find the arc length of the curve $\vec{r} = t^2 \hat{i} - 3t \hat{j} + t^3 \hat{k}$ from (1, -3, 1) to (4, -6, 8).

[2]

2. (a) Use L-Hospital Rule to find $\lim_{x \rightarrow 0} \frac{x^3 - 2x^2}{\sin^2 x}$ [6+6]

(b) If $y = e^{ax} \cos x$ then find $\frac{d^n y}{dx^n}$

3. (a) Find the radius of curvature for the curve $y^2 = 2x(3-x^2)$ at $x=1$ [6+6]

(b) Trace the curve $r = a(1 + \cos \theta)$

4. (a) Find the asymptotes parallel to co-ordinate axes for the curve $x^2y^2 - a^2x^2 - 16y^2 + 2xy - 3x^2 = 0$ [6+6]

(b) Derive the reduction formula for $\int \sec^n x dx$

5. (a) Find the equation of the cone whose vertex is at $(2,1,3)$ and guiding curve is $x^2 + y^2 = 16, z=0$ [6+6]

(b) Find the circle of curvature to the parabola $y^2 = 4ax$ at (a, a)

6. (a) Find the equation of cylinder having guiding curve [6+6]

$4x^2 - 9y^2 = 36, z = 2$, and whose generator are parallel to

the line $\frac{x-1}{z} = \frac{y+2}{3} = \frac{z-1}{1}$.

(b) Find the scalar and vector triple products of the vector

$\vec{a} = 2\hat{i} - 3\hat{j}, \vec{b} = 3\hat{j} + 2\hat{k}, \vec{c} = \hat{i} + 2\hat{j} + 2\hat{k}$

7. (a) If $\vec{r}(t) = e^{2t} \sin t \hat{i} + e^{2t} \cos t \hat{j} + e^{2t} \hat{k}$, then find [6+6]

$[\vec{r}, \vec{r}', \vec{r}'']$. (Scalar triple product).

[3]

(b) Find the volume of the parallelepiped whose three adjacent sides are $\vec{a} = 3\hat{i} - 4\hat{j} + \hat{k}, \vec{b} = 2\hat{i} + 2\hat{j} - \hat{k}$, and $\vec{c} = 2\hat{i} + 2\hat{j} + 3\hat{k}$.

8. (a) Use reduction formula to evaluate $\int \cos^n x dx$. [6+6]

(b) Find the radius of curvature for the following curve

$x = 6t^2 - 3t^4, y = 8t^3$

- x - x - x -