

No. of Pages: 2

GACR
+3, 3rd SEMESTER EXAMINATION-2019
(ARTS)

Sub.- SOCIOLOGY
PAPER : GE-III

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

[2 x 8

1. Write brief notes on any EIGHT of the followings.
 - a) What is Social change?
 - b) Define social progress.
 - c) Mention two theorist of Functionalist Theory of social change.
 - d) What is cyclical theory of social change?
 - e) Name two biological factors of social change.
 - f) Mention the impact of technology on society.
 - g) Write two indicators of social development.
 - h) Explain the uses of Gender Development Index.
 - i) Name the theories of Economic Growth.
 - j) Discuss the merits of Gandhian model of development.

P.T.O.

GROUP- B

[16x4

Answer any FOUR questions.

2. Examine the various factors of social change.
3. Discuss the evolutionary theory of social change and its impact on society.
4. Describe the factors preventing economic growth.
5. Critically examine the Capitalist Model of development .
6. Discuss the indicators of Gender Development Index and its uses.
7. Examine the advantages and disadvantages of Gandhian model of Development .
8. Explain the indicators of social development.
9. What is social progress? Discuss the nature of social progress?



+3, 3rd SEMESTER EXAMINATION-2019
(SCIENCE)

Sub: PHYSICS

Full Marks: 60

Paper: GE-III

Time: 3 Hours

Answer the questions as per instruction.
The figure in the right hand margin indicate marks.
Question No. 1 is mandatory.

GROUP - A

[2x6]

1. Answer any SIX questions.

- (a) Prove that $\vec{A} \times (\vec{B} \times \vec{C}) + \vec{B} \times (\vec{C} \times \vec{A}) + \vec{C} \times (\vec{A} \times \vec{B}) = 0$
- (b) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then find $\text{div } \hat{r}$.
- (c) Define electric flux. Write its S.I unit and dimension.
- (d) Show that line integral of an electric field over a closed path is zero.
- (e) What is polarisation of a dielectric?
- (f) Explain a current carrying circular coil behaves as a magnetic dipole.
- (g) Find relation between magnetic permeability magnetic susceptibility.
- (h) State Lenz's law. This law obeys which conservation principle.
- (i) Explain displacement current.
- (j) Write basic properties of electromagnetic waves.

SECTION - B

Answer any FOUR questions.

2. (a) Define divergence of a vector field. What is its physical meaning? Give two examples. [6]

(P.T.O...)

- (b) Derive an expression for divergence of a vector field in cartesian co-ordinates from first principle. [6]
3. Define electric field intensity and electric potential. Then calculate electric potential and electric intensity at points outside and inside a solid sphere. [12]
4. Derive an expression for Gauss's law in the presence of dielectric. Also discuss integral form of Gauss's law. [12]
5. (a) Prove that $\vec{\nabla} \times \vec{B} = \mu_0 \vec{j}$ and $\vec{\nabla} \cdot \vec{B} = 0$, where \vec{B} = magnetic field induction, \vec{j} = current density vector. [8]
- (b) What is the value of $\vec{\nabla} \cdot \vec{B}$ and $\vec{\nabla} \times \vec{B}$ for points inside and outside a current loop? [4]
6. (a) State Faraday's law of electro magnetic induction. Then derive expressions for its integral form and differential form. [8]
- (b) Derive an expression for energy stored in magnetic field. [4]
7. (a) Derive an expression for equation of continuity. [6]
- (b) Define displacement current and derive an expression for it. [6]
8. State Biot-Savart's law. Derive an expression for magnetic field induction due to a long straight current carrying conductor. [12]

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GACR
+3, 3rd SEMESTER EXAMINATION-2019
(ARTS)

Sub.- Political Science
PAPER : GE-III

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

[2 x8

1. Answer any **EIGHT** of the following.
- a) Humanity and Morality
 - b) Statist Culture
 - c) Non-Exploitative Economy
 - d) Integrated Rural Development.
 - e) Peace movement
 - f) Can Gandhigiri work in 21st century?
 - g) Gandhi on Democracy
 - h) Gandhi's views on industrialisation
 - i) Evils of urbanisation
 - j) Annihilation of caste
 - k) Economics of Khadi.

P.T.O.

GROUP - B

Answer any FOUR questions.

[16x4

2. Examine Gandhi's attack on western concepts of civilisation and modern industrialisation.
3. Critically examine Gandhi's approach to development.
4. Discuss the peasant Satyagraha at Kheda by Gandhiji.
5. Is Gandhian approach relevant to solve the contemporary tensions between Hindus and Muslims of India?
6. Explain the anti-racism movement of Gandhiji in South Africa.
7. Explain Gandhi's new perception of women and their role in the freedom struggle.
8. Discuss the basic features of Swadeshi model of Gandhian economic thought.



GACR
+3, 3rd SEMESTER EXAMINATION-2019
(ARTS)

Sub.- HINDI
PAPER : GE-III

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.

[2x8]

GROUP- A

1. निम्नलिखित किन्हीं आठ प्रश्नों के संक्षिप्त उत्तर दीजिए।
 - क) शास्त्रीयवाद किस प्रवृत्ति का विरोध करता है?
 - ख) स्वच्छन्दतावाद के विकास में किन अंग्रेजी कवियों ने प्रमुख भूमिका निभाई?
 - ग) अभिव्यंजनावाद के प्रवर्तक कौन है? उनका जन्म कहाँ हुआ था?
 - घ) 'बिम्ब' किसे कहते हैं?
 - ङ) 'प्रतीकवाद' के किन्ही दो समर्थकों का नाम लिखिए?
 - च) 'अस्तित्ववाद' में 'अस्तित्व' का क्या अभिप्राय है?
 - छ) मार्क्सवाद के अनुसार मानव चेतना को परिचालित करनेवाला मूल तत्त्व क्या है?
 - ज) 'मनोविश्लेषणवाद' विज्ञान की किस शाखा से अनुशासित होता है?
 - झ) यथार्थवादी आन्दोलन सबसे पहले कहाँ शुरु हुआ था?

- ज) 'आधुनिकतावाद' और उत्तर आधुनिकतावाद में मूल अंतर क्या है?

GROUP - B

[16x4]

2. 'शास्त्रीयतावाद' एवं 'स्वच्छंदतावाद' की प्रवृत्तियों की तुलना कीजिए।

अथवा

'अभिव्यंजनावाद' की मूल स्थापनाओं पर विचार कीजिए।

3. 'अस्तित्ववाद' का अर्थ स्पष्ट करते हुए उसकी प्रमुख प्रवृत्तियों की आन्दोलन कीजिए।

अथवा

मार्क्सवाद के कला तथा साहित्य सम्बन्धी दृष्टिकोण का विवेचन कीजिए।

4. मनोविश्लेषणवाद के स्वरूप को स्पष्ट करते हुए साहित्य पर उसके प्रभाव की आलोचना कीजिए।

अथवा

'उत्तर आधुनिकतावाद' की प्रवृत्तियों का विश्लेषण कीजिए।

5. किन्ही दो पर टिप्पणियों लिखिए।

- क) बिम्बवाद
ख) प्रतीकवाद
ग) यथार्थवाद
घ) मार्क्सवादी आलोचना



**+3, 3rd SEMESTER EXAMINATION-2019
(SCIENCE)**

Sub: BOTANY

Full Marks: 60

Paper: GE-III

Time: 3 Hours

*Answer the questions as per instruction.
The figure in the right hand margin indicate marks.
Question No. 1 is mandatory.*

GROUP - A

[2x6]

1. Write short notes on any SIX of the following.

- (a) Meristematic tissue
- (b) Heartwood
- (c) Two anatomical adaptations in xerophytes
- (d) Cross pollination
- (e) Apomixis
- (f) Cleistogamy
- (g) Seed structure
- (h) Annual Ring

SECTION - B

Answer any FOUR questions.

- 2. Give the anatomical features of Dicot stem with neat labelled diagram. [12]
- 3. Briefly describe the process of secondary growth in the stelar region of Dicot stem. [12]
- 4. Write down the ultrastructure of a typical embryo sac and describe any two types of embryo sacs you have studied. [12]

(P.T.O...)

[2]

5. Mention the origin, types and functions of Endosperm. [12]
6. What do you mean by polyembryony. Make a detailed discussions of different types of polyembryony. [12]
7. Write short note. [6x2]
- (a) Complex tissue
 - (b) Stomata
8. Write short note. [6x2]
- (a) Double fertilisation and triple fusion.
 - (b) Mechanism for seed dispersal.

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**+3, 3rd SEMESTER EXAMINATION-2019
(SCIENCE)**

Sub: CSC

Full Marks: 60

Paper: GE-III

Time: 3 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Question No. 1 is mandatory.

1. Answer any SIX questions.

[2x6]

- (a) What are the features of OOPs.
- (b) What is ADT?
- (c) Differentiate between for Loop & While loop with examples.
- (d) Discuss about call by value and call by reference?
- (e) What do you mean by friend function?
- (f) What are the rules of overloading operator?
- (g) Write the syntax of Constructor?
- (h) What is file pointers?

GROUP-B

Answer any FOUR questions.

- 2. (a) State and explain scope resolution operator with examples. [6]
- (b) Discuss implicit & explicit conversions in C++. [6]
- 3. (a) Briefly discuss inline functions. [6]
- (b) Write a function to read a matrix of size $m \times n$ from the key board? [6]

4. (a) What do you mean by dynamic initialization of objects? Why do we need to do this? How dynamic initialization of objects is achieved? [6]
- (b) Differentiate between operator overloading & function overloading? [6]
5. (a) Write a C++ program to illustrate multiple inheritance. [6]
- (b) Explain the syntax for passing arguments to base class constructor in multiple inheritance. [6]
6. (a) Define Pure virtual function. Write a C++ program to illustrate pure virtual function. [6]
- (b) Differentiate between Early binding & Late Binding with examples. Explain how late binding can be achieved in C++. [6]
7. (a) Explain the use of ifstream and ofstream classes for file input & output. [6]
- (b) Discuss the various forms of get () function supported by the input stream. How do the following two statements differ in operations? [6]
- ```
cin >>c;
cin.get(c);
```
8. Write short notes on following (any Three). [4x3]
- (i) Tokens
  - (ii) polymorphism
  - (iii) inheritance
  - (iv) Opening & closing of file

**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019  
(COMMERCE)**

**Sub: Micro Economics**

Full Marks: 80

**Paper: GE-III**

Time: 3 Hours

*Answer the questions as per instruction.  
The figure in the right hand margin indicate marks.  
Question No. 1 is mandatory.*

**1. Answer any EIGHT questions.**

[2x8]

- (a) Differentiate between micro and macro economics.
- (b) What are the leakages in circular flow of NI?
- (c) What is the ongoing repo rate of RBI?
- (d) Distinguish between inflation and depression.
- (e) Differentiate between open economy and closed economy?
- (f) Differentiate between spending and investment with example.
- (g) What is voluntary unemployment?
- (h) What is unemployability??
- (i) Who said "In the long run, we are all dead"?
- (j) Draw the diagram of three sector circular flow of NI.

**Answer any FOUR questions.**

[16x4]

2. Explain the working of IS-LM framework.
3. How effective are fiscal policies during inflation in India?
4. Mild amount of inflation is good for an economy. Give your arguments, for or against the statement.

(P.T.O...)

[2]

5. How is exchange rate determination in India different from that of China?
6. Explain Mundell-Fleming model?
7. Explain nature and scope of macro economics.
8. “The Indian Economy is going into a tailspin; it is the time when you don’t worry so much about monetary stability and you worry a little bit more about demand”. is what being said by Abhijit Banerjee, the Nobel Laureate of economics (2019). Do you agree with him? Justify your stand.

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No. of Pages:2

GACR

**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019  
(SCIENCE)**

**Sub.- ZOOLOGY  
PAPER : Core-GE-III**

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. Answer any SIX questions of the following

- a) Biological Assay
- b) pH Meter
- c) Microphotography
- d) Sterilization
- e) Cell harvesting.
- f) Radioisotopes
- g) Agarose gel Electrophoresis.
- h) Antigen - Antibody interaction

P.T.O.

**GROUP-B**

[12x4

**Answer any Four questions.**

2. What are Assays? Write different types of immuno assays in detail.
3. What is centrifugation? Write the principles, types and applications of centrifuge.
4. What is fluorescence microscope? How fluorescence microscope differ from light microscope, describe with their working principles?
5. Discuss various steps of culture media preparation and add note on different methods of sterilization used in microbiology.
6. What are the separation techniques in biology? Discuss the working principles of chromatography in separating biomolecules.
7. Discuss the working principle, mechanism and advantages of autoradiography in biological system.
8. Explain different surgical techniques used for organ ablation and add note on ovariectomy.





**GACR**  
**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(ARTS)**

**Sub.- ODIA**  
**PAPER : GE- III**

Time: 3 Hours  
Full Marks: 80

ଯେ କୌଣସି ୫ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅ । ପ୍ରଥମ ପ୍ରଶ୍ନର ଉତ୍ତର ଅନିବାର୍ଯ୍ୟ ।

*The figure in the right hand margin indicate marks.*

‘କ’ ବିଭାଗ

( ୨×୮

ଯେକୌଣସି ୮ଟି ପ୍ରଶ୍ନର ସଂକ୍ଷିପ୍ତ ଉତ୍ତର ଦିଅ ।

୧. କ) ଗଣମାଧ୍ୟମ କାହାକୁ କହନ୍ତି ?
- ଖ) ବୈଦ୍ୟୁତିକ ଗଣମାଧ୍ୟମ କହିଲେ କ’ଣ ବୁଝ ?
- ଗ) ଦୁର୍ନୀତି ନିବାରଣରେ ଗଣମାଧ୍ୟମର କି ଭୂମିକା ରହିଛି ?
- ଘ) ସାମାଜିକ ଗଣମାଧ୍ୟମର ଉପଯୋଗିତା କ’ଣ ?
- ଙ) ସାମ୍ବାଦିକର ନିରପେକ୍ଷତା ଜରୁରୀ କାହିଁକି ?
- ଚ) କାମ୍ବଳ ସାମ୍ବାଦିକତାର କି ପ୍ରଭାବ ପଡ଼ିଥାଏ ?
- ଛ) ବୈଦ୍ୟୁତିକ ଗଣମାଧ୍ୟମର ଭାଷା ଓ ମୁଦ୍ରିତ ଗଣମାଧ୍ୟମର ଭାଷା ମଧ୍ୟରେ କି ପାର୍ଥକ୍ୟ ରହିଛି ?
- ଜ) ସମ୍ବାଦପତ୍ରର ସମ୍ପାଦକୀୟ କ’ଣ ?
- ଝ) ‘ଫିଚର’ କାହାକୁ କୁହାଯାଏ ?
- ଞ) ଫିଚର ରଚନା କେଉଁ ବିଷୟ ଉପରେ ଆଧାରିତ ହୋଇଥାଏ ?

‘ଖ’ ବିଭାଗ

(୧୭×୪

(ଯେ କୌଣସି ୪ଟି ପ୍ରଶ୍ନର ଦୀର୍ଘ ଉତ୍ତର ଲେଖ)

୨ ଗଣମାଧ୍ୟମର ପ୍ରକାରଭେଦ ସମ୍ପର୍କରେ ଆଲୋଚନା କର ।

ଅଥବା

ଗଣମାଧ୍ୟମର ପରିଭାଷା ଓ ପରିସର ବିଷୟରେ ଚର୍ଚ୍ଚା କର ।

୩. ସାମାଜିକ ଗଣମାଧ୍ୟମର ଉପକାରିତା ଓ ଅପକାରିତା ବିଷୟରେ ଆଲୋକପାତ କର ।

ଅଥବା

ବୈଦ୍ୟୁତିକ ଗଣମାଧ୍ୟମର ପ୍ରଭାବଶାଳିତା ସମ୍ପର୍କରେ ବିଶ୍ଳେଷଣ କର ।

୪. ଦକ୍ଷ ସାମ୍ବାଦିକର ଗୁଣାବଳୀ ବୁଝାଇ ଦିଅ ।

ଅଥବା

ସମ୍ବାଦ ରଚନାର ବିଭିନ୍ନ ସ୍ତର ଆଲୋଚନା କର ।

୫. ସମ୍ବାଦର ଭାଷା ଓ ଶୈଳୀ ବିଷୟରେ ଆଲୋଚନା କର ।

ଅଥବା

ତୁମ ଅଞ୍ଚଳରେ ଅନୁଷ୍ଠିତ କୌଣସି ଏକ ବାର୍ଷିକ କ୍ରୀଡ଼ା ଉତ୍ସବ ସମ୍ପର୍କରେ ଏକ ସମ୍ବାଦର ଚିଠା ପ୍ରସ୍ତୁତ କର ।

୬. ଫିଚର ରଚନାର ଆଭିମୁଖ୍ୟ କ’ଣ ବୁଝାଇଦିଅ ।

ଅଥବା

ପର୍ଯ୍ୟଟନ ଭିତ୍ତିକ ଫିଚର ରଚନାର ପଦ୍ଧତି ଆଲୋଚନା କର ।



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**GACR**  
**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(ARTS)**

**Sub.- PHILOSOPHY**  
**PAPER : GE- III**

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**

[2 x 8

1. Answer any **EIGHT** of the following.
- i) What is moral action?
  - ii) What is factual judgement?
  - iii) What is hedonism?
  - iv) What is the idea of rigorism of Kant?
  - v) What is the idealistic view of society?
  - vi) What is reformatory theory of punishment?
  - vii) Define the nature of secularism?
  - viii) What is social justice?
  - ix) Define the nature of Equality.
  - x) What is human right?

*P.T.O.*

**GROUP- B**

[16x4

**Answer any FOUR questions.**

2. What is Ethics? Discuss the salient features of Ethics.
3. Explain the philosophical significance of the object of moral judgement.
4. Discuss the salient features of Perfectionism.
5. What is the philosophical doctrine of preventive theory of punishment? Elucidate.
6. Explain in brief the concept of Liberty.
7. Discuss the philosophical significance of the concept of Sarvodaya.
8. Explain in brief the concept of globalization.



No. of Pages: 2

**GACR**  
**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(ARTS)**

**Sub.- ECONOMICS**  
**PAPER : GE- III**

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**

[2 x 8

1. **Answer any EIGHT of the following in two or three sentences each.**

- a) Write the major problems of Indian agriculture.
- b) Which states of India have derived the maximum benefits from new agricultural strategy?
- c) What is MRTP ACT?
- d) Write any two functions of NABARD.
- e) What is BOP?
- f) What is FERA?
- g) Write two Government measures to improve agricultural marketing.
- h) What are the importance of HRD?
- i) What were the Land tenure system prevalent in India?
- j) What is the role of Tertiary sector in economic growth?

*P.T.O.*

## **Group - B**

**Answer any FOUR questions.**

[16x4

2. What are the land reforms measures introduced in India and what are their objectives?
3. How the green evolution had created huge impact on our economy?
4. Discuss important features of Industrial Policies Resolution 1948 and 1956.
5. What is small scale industry? What are the problems of small scale industries in India?
6. Explain the problems of Indian education systems and discuss education policies adopted for improving Indian education systems.
7. Explain major reforms in Export Import Policy since 1991.



No. of Pages: 2

**GACR**  
**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(ARTS)**

**Sub.- EDUCATION**  
**PAPER : GE-III**

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** of the following.
- a) Basic principles of Assessment.
  - b) Role of measurement.
  - c) Instructional objectives
  - d) Concepts of continuous and comprehensive Evaluation.
  - e) Bloom's Taxonomy
  - f) Self Reporting Techniques
  - g) Construction of objective type question.
  - h) Credit system

**GROUP- B**

[12x4

**Answer any FOUR questions.**

2. What is the need and scope of measurement

OR

What is the relationship between measurement and assessment in Education

*P.T.O.*

3. What do you mean by a Questionnaire? Discuss the characteristics of a good questionnaire.

OR

What is the meant by Rating scale? Discuss the different types of Rating Scales.

4. What are the differences between criterion referenced and Norm referenced Test ?

OR

Explain characteristics of Teacher made Test and standardised Test.

5. Differentiate between Marketing system and Grading system.

OR

What is observation Technique? Explain Anecdotal Records as an alternative techniques of assessment.

6. What role can information technology play in educational assessment.

OR

How computer can help in construction of tests?

7. What is objective based question and objective type question? Give suitable examples of objectives type questions.

OR

Prepare a good achievement test on any school subject.





**GACR**  
**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(ARTS)**

**Sub.- HISTORY**  
**PAPER : GE-III**

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 x8

1. Answer any EIGHT of the following.
- a) Mention two important economic impact of British rule in India.
  - b) Which was the First Vernacular paper in India? By which press was it published?
  - c) What do you mean by safety valve theory of Indian National Congress?
  - d) Name two important programmes of Swadeshi Movement.
  - e) What do you mean by Satyagraha?
  - f) Write down the names of two leaders of Indian National Army (INA) who faced trial by the British.
  - g) What do you mean by two nation theory?
  - h) Who gave the idea of Pakistan and when?
  - i) Who was Dr. B.R. Ambedkar?
  - j) What was instrument of accession?

## SECTION - B

Answer any **FOUR** questions.

[16x4

2. Assess the role of press and journalism in the growth of national consciousness in India.
3. Examine the achievements of Moderates between 1885-1905.
4. Briefly describe the methods adopted by Gandhi for political struggle in India.
5. Give a brief account of Quit India Movement in India.
6. Trace the objectives and activities of Hindu Mahasabha.
7. Assess the role of Sardar Patel in the process of integration of princely states.
8. What were the factors responsible for the partition of India?



**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019**  
**(SCIENCE)**

Sub: MATHEMATICS

Full Marks: 80

Paper: GE-III

Time: 3 Hours

*Answer the questions as per instruction.*

*The figure in the right hand margin indicate marks.*

*Question No. 1 is mandatory.*

1. Answer any Eight questions.

[2x8]

(a) Test the linear independency of (1,3) (2,4) and (2,6).

(b) Find the rank of  $\begin{pmatrix} 1 & 3 & 2 & 1 & -1 \\ 2 & 6 & 4 & 2 & -2 \end{pmatrix}$ (c) Find the eigen values of  $\begin{pmatrix} 0 & 0 \\ 0 & 3 \end{pmatrix}$ 

(d) Prove that a skew symmetric determinant of even order is a perfect square by an example.

(e) Solve the system  $2x-3y = -1$ ;  $x+2y = 3$ .(f) Find the characteristic equation for  $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$ 

(g) Define normal subgroup with example.

(h) State isomorphism theorem.

(i) Define zero divisor with example.

(j) Define irreducible with example.

**Answer any FOUR questions.**

2. (a) Test the Linear dependency of

[4+4]

(i) (13, 17, 21), (12, 16, 23), (10, 14, 18)

(ii) (2, 1, 4, 3), (3, 2, 1, 4), (4, 3, 2, 1)

(P.T.O...)

(b) Find the rank and nullity of  $\begin{pmatrix} 1 & 1 & 3 & 1 \\ 0 & -1 & -1 & 1 \\ 3 & 1 & 7 & 5 \\ 4 & 0 & 9 & 7 \end{pmatrix}$  [8]

3. (a) Find the inverse of the matrix using row operation [8]

method.  $\begin{pmatrix} 2 & 3 & 5 \\ 1 & 1 & 2 \\ 3 & 2 & 1 \end{pmatrix}$

(b) Find the eigen vectors of the matrix  $\begin{pmatrix} 3 & 4 \\ 3 & 2 \end{pmatrix}$ . [8]

4. (a) Define skew-symmetric determinant. Prove that a skew-symmetric determinant of odd order has the value zero. [8]

(b) For what value of  $\lambda$  and  $\mu$  does the system of equations. [8]

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

$$2x + 5y - z = 6$$

$$3x + 2y + \lambda z = \mu \text{ has infinite solution.}$$

5. (a) If  $G$  is a group and  $H$  is closed under multiplication then prove that  $H$  is subgroup of  $G$ . [8]

(b) State and prove Lagrange's theorem. [8]

6. (a) If  $G$  is a group and  $H$  is a subgroup of index 2 in  $G$ , then prove that  $H$  is a normal subgroup of  $G$ . [8]

(b) If  $U$  is an ideal of the ring  $R$ , then prove  $R/U$  is a ring and is a homomorphic image of  $R$ . [8]

7. (a) State and prove Division algorithm. [8]

(b) Prove that  $X^3 - 9$  is reducible over the integers mod 11. [8]

8. Distinguish between (any two). [8+8]

(a) Dimensions and Basis.

(b) Cyclic group and Permutation Groups.

(c) Homomorphism and isomorphism.

(d) Reducible and irreducible.

- x - x - x -

**+3, 3<sup>rd</sup> SEMESTER EXAMINATION-2019  
(SCIENCE)**

Sub: CHEMISTRY

Full Marks: 60

Paper: GE-III

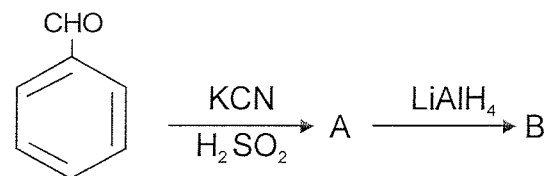
Time: 3 Hours

*Answer the questions as per instruction.**The figure in the right hand margin indicate marks.**Question No. 1 is mandatory.***GROUP - A**

[2x6]

**1. Answer any SIX questions.**

- State third law of thermodynamics.
- establish the relationship of  $K_p$ ,  $K_c$ ,  $K_\lambda$  for the reaction  $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
- Calculate the pH of  $10^{-3}$  M KOH and  $10^{-3}$  M  $HNO_3$ .
- What is the order of reactivity of alkyl, allyl, benzyl, vinyl and aryl halides?
- Complete the reaction:



- What happens when ethyl methyl ether is heated with HI?
- Give a chemical test that would distinguish primary and secondary alcohols.
- Write a single step reaction used to convert acetophenone to ethyl benzene. Give the name of reaction.

[6]

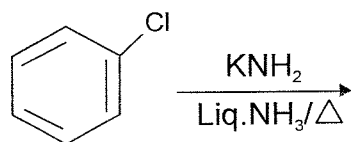
[6]

(P.T.O...)

[2]

**SECTION - B****Answer any FOUR questions.**

2. (a) State the different forms of first law of thermodynamics. [6]  
Derive its mathematical formulation.
- (b) Derive Kirchhoff's equation. [6]
3. (a) State and explain Le-chatelier's principle. Discuss its application to the following equilibrium: [8]  
 $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) - \text{heat}.$
- (b) Explain bond energy. [4]
4. Write notes on: [4x3]
- (a) Common ion effect
- (b) Ionic product of water
- (c) Solubility product
5. (a) How will you prepare benzene from [2x3]
- (i) Phenol
- (ii) Acetylene
- (iii) Sodium benzoate.
- (b) Discuss the mechanism of [3x2]
- (i) Sulphonation of benzene
- (ii) Friedel Craft's acylation reaction.
6. (a) Predict the product and write the mechanism [4]



[3]

- (b) Starting from chlorobenzene, how [4]  
(i) Aniline, (ii) phenyl cyanide are prepared.
- (c) Write a note on ester hydrolysis. [4]
7. Write notes on [4x3]
- (a) Reimer-Tiemann Reaction
- (b) Gattermann-Koch Reaction
- (c) Schotten-Baumann Reaction
8. Discuss the following reaction with mechanism. [4x3]
- (a) Cannizzaro's Reaction
- (b) Benzoin Condensation
- (c) MPV reduction.

- x - x - x -