

No. of Pages: 2

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

**Sub.- SOCIOLOGY**  
**PAPER : Core - V**

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. [2 x 8]
- a) What is Social Research?
  - b) Define hypothesis.
  - c) What is interview scheduled?
  - d) What is telephonic interaction ?
  - e) Define sampling.
  - f) What do you mean by snow-ball random sampling?
  - g) What is content analysis?
  - h) What is survey research?
  - i) What is exploratory research design?
  - j) Explain case study method.

*P.T.O.*

**Answer any FOUR questions.**

[16x4

2. Highlight the merits and demerits of qualitative research.
3. Define social research and discuss the major steps in research.
4. Define observation and discuss its type.
5. Discuss various type of sampling. Justify its rationale in sociological research.
6.
  - a) Explain merits and demerits of survey research.
  - b) Highlight difference between interview scheduled and questionnaire.
7.
  - a) Explain the role of sampling in social research.
  - b) What are the different type of research design? Explain.
8.
  - a) What do you mean by measures of central tendency.
  - b) Discuss the type and significance of content analysis.



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

**Sub.- HISTORY**  
**PAPER : Core-V**

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. [8 x 2]
- a) What do you mean by epigraph?
  - b) What was the book composed by Al-Biruni?
  - c) What is the meaning of feudalism?
  - d) Who were the Turks?
  - e) Which Rastrakuta ruler has built the famous Kailash Temple of Siva at Ellora?
  - f) Who was the first Pratihara to capture and occupied Kanauj?
  - g) Who was the founder of Chola destiny in South?
  - h) Which Pala ruler founded the famous Vikramsila University?
  - i) What was the important role of merchant guilds?
  - j) What is the regional temple style of South India?
  - k) What were the chief items of export in maritime trade of India?

*P.T.O.*

**Answer any FOUR questions.**

2. Describe in brief the existence of Rajput states in India. [16]
3. Describe the condition of India in the ere of the Turkish invasion. [16]
4. Give the effects of Mahmud Ghazni and Muhammad Ghori's invasion on India. [16]
5. What was agricultural expansion and crops pattern in India during the period of your study? [16]
6. Examine maritime activities of India and cultural impact on society. [16]
7. What are the factors contributed for growth of regional languages and literature? [16]
8. Analyse the impact of Bhakti movement on medieval Indian society. [16]



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

**Sub: BOTANY**  
**Paper: CORE-V**

Full Marks: 60  
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. Each in 3 to 5 sentences.**

- (a) Simple Tissue
- (b) Tunica-carpus Theory
- (c) Quiscent center
- (d) Early and late wood
- (e) Dendrochronology
- (f) Epicuticular waxes
- (g) Lithocyst
- (h) Reaction wood

**SECTION - B**

**Answer any FOUR questions.**

- 2. Make a brief classification of tissue. Describe the types of complex tissue that is involved in the transport of water. [12]
- 3. Enumerate the theories regarding the organisation of shoot apex. [12]
- 4. What do mean by the secondary growth in the extra-stelar region. Discuss the development and composition of the periderm. [12]

(P.T.O...)

[2]

5. Describe the structure and function of Epidermis cuticle and trichome. [12]
6. With diagram, make a detailed discussion on Hydathodes and Laticifers. [12]
7. Write short notes [6x2]
- (a) Stomata classification
  - (b) Kranz Anatomy
8. Write short notes on [6x2]
- (a) Heart wood and sapwood
  - (b) Sieve elements.

- x - x - x -

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

Full Marks: 60

**Paper: CORE-V**

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) What is zone refining process?
- (b) How does roasting differ from calcination?
- (c) What are Caro's acid and Marshall's acid? Write their formula.
- (d)  $\text{NF}_3$  does not act as a base but  $\text{NH}_3$  acts. Explain.
- (e) Why is  $\text{HClO}_4$  more acidic than  $\text{HBrO}_4$ ?
- (f) Write uses of He gas.
- (g) Give two applications of silicones.
- (h) Why Xenon forms compound with Fluorine and Oxygens?

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

- 2. (a) Discuss Ellingham diagrams for reduction of magnesium oxide using carbon and carbon monoxide as reducing agent. [8]
- (b) Write notes on Van Arkel-de-Boer process. [4]
- 3. (a) Describe Lewis acid-base concept. [4]

(P.T.O...)

- (b) Explain the relative strength of acids on the basis of dissociation constant. [4]
4. (a) Discuss the anomalous behaviour of lithium. [4]
- (b) explain the complex formation tendency of alkali metals. [4]
- (c) Describe the preparation and properties of Beryllium acetate. [4]
5. (a) How are hydrides classified? Discuss their characteristics. [3+3]
- (b) What do you mean by catenation? Name two elements which show this property. [3]
- (c) Write a note on: Allotropy. [3]
6. (a) What is diborane? Draw and discuss the orbital structure of Diborane. [4]
- (b) Write notes on: [4x2]
- (i) Graphitic compounds
- (ii) Basic properties of halogens
7. (a) Discuss the structure and bonding in  $\text{XeF}_6$ . [4]
- (b) Write two methods of preparation and two chemical properties of  $\text{XeF}_4$ . [4]
- (c) Why Noble gases are called inert gases? Write two uses of Neon. [2]
- (d) Why is it difficult to store  $\text{XeF}_6$  in glass vessel? [2]
8. (a) Write comparison of inorganic polymers with organic polymers. [4]
- (b) Explain the structure of Borazine. [4]
- (c) write notes on silicates. [4]



No. of Pages: 2

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

**Sub.- EDUCATION**  
**PAPER : Core-V**

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**

[6 x 2

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

- i) Define educational technology.
- ii) Write the concept of hardware approach.
- iii) State the nature of communication process.
- iv) What are the barriers of communication process?
- v) What is Micro-teaching?
- vi) Write the concept of Inductive model.
- vii) Who was the propounder of concept Attainment model?
- viii) State the importance of ICT enabled devices.

**Group - B**

[12 x 4

**Answer any FOUR questions.**

2. Discuss the nature and scope of educational technology.

OR

*P.T.O.*

Explain different approaches to educational technology.

3. What is communication process? Discuss the barriers of communication process.

OR

Give an introduction to study of classroom communication through Flander's Interaction Analysis.

4. What is Programmed Instruction? Explain its basic principles and applications.

OR

What is Simulated Teaching? Discuss its procedure and applications.

5. Discuss Advance Organiser Model with reference to social system and application.

OR

What is Inductive Model of teaching? Explain it with reference to syntax and application.

6. Discuss the importance of ICT enabled devices in teaching learning process.

OR

What do you mean by TLM? Explain how can you apply these in teaching-learning situations.



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

**Sub: CSC (Operating System)**

Full Marks: 60

**Paper: CORE-V**

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 is job queue, ready queue and device queue?
- (b) Differentiate among short term, long term and medium term schedulers.
- (c) What is critical section?
- (d) What is a Ganttchart? State its use.
- (e) Define system call.
- (f) Differentiate between process and thread.
- (g) Describe the difference among First Fit, Best Fit and Worst Fit, Memory management mechanism.
- (h) What is Belady Anomaly?

**GROUP-B**

**Answer any FOUR questions.**

2. (a) Explain different services provided by operating system.

[6]

(b) Describe features of distributed and real time operating system.

[6]

3.

Process	Arrival Time(Ms)	Burst Time (Ms)
P <sub>1</sub>	0	11
P <sub>2</sub>	1	5
P <sub>3</sub>	2	6

[12]

[2]

Find the average waiting time and turn around time for the following CPU scheduling algorithm.

(i) FCFS

(ii) SJF

(iii) Round Robin (TQ = 5ms)

4. (a) Explain process control Block (PCB) and its features. [6]  
(b) Explain the critical section problem with example. [6]
5. (a) Why Swapping is needed? How swapping process is managed by OS? [6]  
(b) Point out the need for page replacement. Explain FIFO, Optimal Page replacement algorithm with example. [6]
6. (a) Explain detail about the basic concepts of Demand paging? [6]  
(b) Describe segmentation memory management mechanism with example. [6]
7. (a) Discuss briefly about Directory Structure. [6]  
(b) Explain in detail about file Allocation Methods. [6]
8. Write short notes on any Three. [4x3]
- (a) RAID  
(b) Thrashing  
(c) Paging  
(d) Semaphore

No. of Pages: 2

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

**Sub.- PHILOSOPHY**  
**PAPER : Core-V**

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**

[8 x 2

1. Answer any EIGHT of the following in two or three sentences each.
- a) What is ordinary perception?
  - b) How testimony is explained?
  - c) How you will explain Advaita?
  - d) What is Videha Mukti?
  - e) How Ramanuja explained the nature of Iswara?
  - f) How Vidya is defined in Upanisad?
  - g) What is Niskama Karma?
  - h) What is the implication of Gyana Joga?
  - i) What is Brahman according to Shankara?
  - j) Explain the nature of Maya.

*P.T.O.*

## Group - B

Answer any FOUR questions.

[16

2. How inference is explained in *Nyāya* philosophy?
3. Explain the significance of verbal testimony in *Nyāya*
4. Explain the theory of *Māyāvāda* according to Shankara.
5. How *Rāmānuja* defined the nature of liberation?
6. How *Rāmānuja* rejected the theory of *Māyāvāda* of Shankara?
7. How *Atman* is explained in Upanisad?
8. Explain the significance of *Karmayoga* in *Bhagavad Gita*.



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

**Sub.- ODIA**

Time: 3 Hours

**PAPER : Core - V**

Full Marks: 80

ଯେ କୌଣସି ଛାତ୍ର ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅ । ପ୍ରଥମ ପ୍ରଶ୍ନର ଉତ୍ତର ଅନିବାର୍ଯ୍ୟ ।

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

‘କ’ ବିଭାଗ

ଯେକୌଣସି ୧୦ଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଗୋଟିଏ ବା ଦୁଇଟି ବାକ୍ୟରେ ଦିଅ ।

(୨×୧୦)

୧. କ) ପ୍ରାକୃତ ଅପଭ୍ରଂଶର କେଉଁ ଶାଖାରୁ ଓଡ଼ିଆ ଭାଷା ଉତ୍ପନ୍ନ ?
- ଖ) କେଉଁ ଚାନ ପରିବ୍ରାଜକ ଓଡ଼ିଆ ଭାଷା ସମ୍ପର୍କରେ ସୂଚନା ଦେଇଛନ୍ତି ?
- ଗ) ‘ଆଧୁନିକ ଭାରତୀୟ ଆର୍ଯ୍ୟଭାଷା’ କହିଲେ କ’ଣ ବୁଝ ?
- ଘ) ଲିପି ଓ ଧ୍ୱନି ମଧ୍ୟରେ ପାର୍ଥକ୍ୟ କ’ଣ ?
- ଙ) ଆଧୁନିକ ଓଡ଼ିଆ ଲିପିର ବିକାଶ ସମୟଖଣ୍ଡ କେତେ ?
- ଚ) ‘କାଳକ ଲିପି’ କ’ଣ ?
- ଛ) ପ୍ରଥମ ଓଡ଼ିଆ ଶିଳାଲେଖର ପରିଚୟ ଦିଅ ।
- ଜ) ଦ୍ୱୈଭାଷିକ ଶିଳାଲେଖ ସମ୍ପର୍କରେ ସୂଚନା ଦିଅ ।
- ଝ) ‘ଓଡ଼ିଆ ଭାଷାତତ୍ତ୍ୱ ଓ ଲିପିର ବିକାଶ’ ପୁସ୍ତକର ପ୍ରଣେତା କିଏ ?
- ଞ) ଚର୍ଯାକାର କାହ୍ନୁପା’ଙ୍କର ପରିଚୟ ପ୍ରଦାନ କର ।
- ଟ) ‘କାଥା ତରୁବର ପଞ୍ଚ ବି ଡାଳ’- ଏହାର ଅର୍ଥ କ’ଣ ?
- ଠ) କେଉଁ ଗବେଷକ ଚର୍ଯାର ଭାଷାକୁ “ହଜାର ବଛରରେ ପୁରାଣେ ବାଲାଂ ଭାଷା” ବୋଲି ଅଭିହିତ କରିଥିଲେ ?
- ଡ) ସାରଳା ମହାଭାରତରେ ବ୍ୟବହୃତ ‘ଆମନ୍ତ’, ‘ତୁମନ୍ତ’ ଇତ୍ୟାଦି ଶବ୍ଦର ଅର୍ଥ କ’ଣ ?
- ଢ) ମାଦଳା ପାଞ୍ଜିରେ ବ୍ୟବହୃତ ଦୁଇଟି ଯାବନିକ ଶବ୍ଦର ଦୃଷ୍ଟାନ୍ତ ଦିଅ ।

‘ଖ’ ବିଭାଗ

(୧୨×୫)

(ଦୀର୍ଘ ଉତ୍ତରମୂଳକ ପ୍ରଶ୍ନ)

୨ ଓଡ଼ିଆ ଭାଷାର ଉତ୍ପତ୍ତି ଉତ୍ସ ଦର୍ଶାଇ ପଞ୍ଚଦଶ ଶତାବ୍ଦୀ ପର୍ଯ୍ୟନ୍ତ ଏହାର କ୍ରମବିକାଶ ବର୍ଣ୍ଣନା କର ।

ଅଥବା

ଷୋଡ଼ଶ ଶତାବ୍ଦୀର ଓଡ଼ିଆ ଭାଷା ପର୍ଯ୍ୟାଲୋଚନା କର ।

୩. ଓଡ଼ିଆ ଲିପିର ବିଭିନ୍ନ ପର୍ଯ୍ୟାୟ ସମ୍ପର୍କରେ ଆଲୋଚନା କର ।

ଅଥବା

ସାମ୍ପ୍ରତିକ ଓଡ଼ିଆ ଲିପିର ବୈଶିଷ୍ଟ୍ୟ ଉଲ୍ଲେଖ କର ।

୪. ଓଡ଼ିଆ ଅଭିଲେଖର ଭାଷାତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ କର ।

ଅଥବା

ଓଡ଼ିଆ ଶିଳାଲେଖ ଗୁଡ଼ିକର ସ୍ଥୂଳ ପରିଚୟ ପ୍ରଦାନ କର ।

୫. ଚର୍ଯାପଦର ଭାଷାତାତ୍ତ୍ୱିକ ମୂଲ୍ୟାୟନ କର ।

ଅଥବା

ସାରଳା ସାହିତ୍ୟର ଭାଷା ବିଭବ ସମ୍ପର୍କରେ ଚର୍ଚ୍ଚା କର ।

୬. ଜଗନ୍ନାଥ ଦାସଙ୍କ ଭାଗବତର ଭାଷା ବିଶ୍ଳେଷଣ କର ।

ଅଥବା

ବଳରାମ ଦାସଙ୍କ ରଚନାବଳୀର ଭାଷାତାତ୍ତ୍ୱିକ ଆଲୋଚନା କର ।





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

**Sub.- ENGLISH**  
**PAPER : Core-V**

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.
- i) How is Romanticism a reaction against the Enlightenment?
  - ii) Why is imagination important to Romanticism?
  - iii) State the theme of 'To a mouse'.
  - iv) What does the speaker mark in every face in 'London'.
  - v) State the significance of the expression 'Nature never did betray / the heart that lover her'.
  - vi) State the theme of 'Tintem Abbey'.
  - vii) What is *The Road to Xanadu* about?
  - viii) State the theme of 'Ode on a Grecian Urn'.
  - ix) State the significance of the expression 'Our sweetest songs are those that tell of saddest thought'.
  - x) Why does Wordsworth write a preface to *Lyrical Ballads*?

**SECTION - B**

[16x4

**Answer any FOUR questions.**

2. Highlight the features of British Romantic literature.
3. Highlight the major concerns of Blake as reflected in the prescribed poems.
4. Critically appreciate Wordsworth's "Ode: intimations of Immortality".
5. Critically appreciate 'Kubla Khan'.
6. Show the features of Romanticism in the prescribed odes of Keats.
7. Discuss Shelley's thoughts in 'To a skylark'.
8. Discuss how Wordsworth thinks of the role of the Poet in Preface to *Lyrical Ballads*.



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

Sub: HINDI

Full Marks: 80

Paper: CORE-V

Time: 3 Hours

*Answer the questions as per instruction.*

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

*Question No. 1 is mandatory.*

१. निम्नलिखित प्रश्नों में से किन्हीं आठ प्रश्नों के उत्तर लिखिए। [2x8]

- (क) अनुवाद के क्षेत्रों का परिचय दीजिए।
- (ख) अनुवाद कर्म में भाषा शिक्षण का क्या महत्व है?
- (ग) एक विश्वसनीय अनुवाद के क्या क्या गुण होता है?
- (घ) सारानुवाद एवं भावानुवाद में क्या अंतर है?
- (ङ) “अनुवाद” शब्द का क्या अर्थ है?
- (च) “स्रोतभाषा” किसे कहते हैं?
- (छ) नाइडा ने अनुवाद प्रक्रिया की कौन-कौन सी अवस्थाएँ बतायी है?
- (ज) कार्यालयी अनुवाद करते समय किन किन बिषयों पर ध्यान देना आवश्यक है?
- (झ) अनुवाद को “सांस्कृतिक सेतु” क्यों कहा जाता है?
- (ञ) कार्यालयी अनुवाद के अलग अलग क्षेत्र क्या हैं?

२. हिन्दी में अनुवाद कीजिए।

Government of Odisha has decided to ban the use of polythene in all over the state from second October-2019. Some kinds plastics which are used in the form of caarry bags are also banned. Single-use plastic shopping bags litter our environment, harm wildlife and negatively affects human health. Plastics bags are harmfum for sea-anials. Plastics bags are not easy to recycle. Those who violate the Government order will be legally punished.

[8]

(P.T.O...)

### ३. अंग्रेजी में अनुवाद कीजिए।

भारत का सर्वोच्च न्यायालय ने एक महत्वपूर्ण राय सुनाते हुए तामिलनाडु सरकार को निर्देश दिया है कि नीलगिरि पहाड के नीचे हाथियों के आने जाने के मार्ग में बने ३९ होटल और रिसर्ट्स को तुरंत बंद करें। न्यायमुर्ति दिपक गुप्त, और न्यायमुर्ति अबदुल नुजीर ने बताया है कि “हाथी हमारा” राष्ट्रीय धरोहर है। हाथी हमारे पर्यावरण को संतुलित रखने वाला प्राणी है। आज वह प्राणी सबसे असुरक्षित है। जंगल नष्ट होने के कारण आज हाथी मनुष्य के बिच संघर्ष बढ़ रहे हैं। इसीलिए सरकार उस पर तुरंत कार्यवाही करे। “हाथी करिडर” को मुक्त एवं सुरक्षित रखे।

### ४. निम्नलिखित तिन प्रश्नों का उत्तर लिखिए।

[16x3]

- (क) अनुवाद के लक्षण के संदर्भ में विद्वानों द्वारा दिए गए मतों की परीक्षा करते हुए उसके स्वरूप को स्पष्ट कीजिए।
- (ख) “अनुवाद कला है अथवा विज्ञान” इस पर अपना तर्क रखिए।
- (ग) अनुवाद प्रक्रिया के विविध सोपानों की चर्चा कीजिए।
- (घ) अनुवाद के संदर्भ में समतुल्यता-सिद्धांत का क्या महत्व है? तर्क सहित समझाइए।
- (ङ) साहित्यिक अनुवाद का स्वरूप एवं उसकी समस्याओं पर प्रकाश डालिए।

No. of Pages: 2

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

**Sub.- Political Science**  
**PAPER : Core-V**

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) Explain the nature of comparative politics.
  - b) Is Eurocentrism an ideology?
  - c) What is Globalisation?
  - d) Define socialism.
  - e) Describe the meaning of colonialism.
  - f) Write a short note on the Decolonisation in British India?
  - g) What is 'Magna Carta'?
  - h) What is filibuster in USA?
  - i) Write a short note on National People's Congress (NPC).
  - j) Define Direct Democracy?

*P.T.O.*

## **SECTION - B**

**Answer any FOUR questions.**

[16x4

2. Define comparative politics. Discuss the nature and scope of comparative politics.
3. What is capitalism? Examine the origin and development of capitalism.
4. Define the meaning and forms of colonialism. Examine the Marxist view of colonialism.
5. Discuss the salient features of the British Constitution.
6. What is the Crown? How does it differ from the King? What are its power?
7. "The US President is a huge colossus with the feet of clay." - Critically examine.
8. What is direct democracy? Discuss the nature of direct democracy in Switzerland.



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

Sub: PHYSICS

Full Marks: 60

Paper: CORE-V

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) Prove that  $\int_0^{2\pi} \cos mx \cos nx \, dx = 0$  for  $m \neq n$ .
- (b) Write down the dirchilet conditions.
- (c) Define even and odd functions.
- (d) Differentiate between standard and probable error.
- (e) Write down the laplacian in spherical polar co-ordinates.
- (f) What is the value of  $a_0$  in the fourier series of  $t^2$  in the interval  $-\pi < t < \pi$ .

**Answer any FOUR questions.**

2. (a) Using  $f(x) = x^4, -\pi < x < \pi$  prove that

[6]

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2} = \frac{\pi^2}{12}$$

(b) Show that the even periodic extension of the function

[6]

$$f(x) = x^4, 0 < x < \pi \text{ gives rise to } \sum_{n=1}^{\infty} \frac{1}{n^4} = \frac{\pi^4}{90}$$

(P.T.O...)

[2]

OR

(a) Derive the complex form of fourier series. [6]

(b) Find the fourier series of  $e^x$  in the interval  $-\pi < x < \pi$  [6]

3. (a) State and prove Parseval's identity. [10]

(b) Find the value of  $\beta(1,2)$ . [2]

OR

(a) If  $\int_0^\pi \sqrt{\tan \theta} d\theta = \frac{\Gamma(p)\Gamma(1-p)}{2}$ , then [6]

find the value of 'p'.

(b) Prove that  $\int_0^{\pi/2} \sin^2 \theta \cos^2 \theta d\theta = \frac{\pi}{16}$ . [6]

4. (a) Use Frobenius method to solve  $y''+w^2y = 0$  [4]

(b) Solve the differential equation [8]

$$x(1-2x)y''-(6x+1)y'-2y = 0$$

OR

(a) Prove that  $\int_{-1}^1 p_m(x)p_n(x) dx = \frac{2}{2n+1} \delta_{mn}$  [6]

(b) Expand  $f(x) = \begin{cases} 0 & -1 < x < 0 \\ 1 & 0 < x < 1 \end{cases}$  in Legendra series. [6]

5. (a) Find the solution of the Laplace equation in spherical co-ordinates. [8]

[3]

(b) A neutral conducting sphere is placed in a uniform electric field. Find the new perturbed electrostatic potential [4]

OR

Obtain the solution for a vibrating string obeying the [12]

equation  $\frac{\partial^2 u}{\partial x^2} = \frac{1}{v^2} \frac{\partial^2 u}{\partial t^2}$ ,  $-l < x < l$  with boundary

conditions  $u(-l, t) = u(l, t)$  for all  $t$

$$u(x, t) = \begin{cases} k(l-x) & \forall 0 < x < l \\ k(l+x) & \forall -l < x < 0 \end{cases}$$

- x - x - x -



No. of Pages:3

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

**Sub.- ZOOLOGY**  
**PAPER : Core-V**

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 within two sentences.
- i) Fish (= Piscine) characters in Ascidian tadpole Larva.
  - ii) Two main characters of class:cyclostomata.
  - iii) Reptilian features of Archaeopteryx.
  - iv) Parental care in Ichthyophis
  - v) Dentition in human being.
  - vi) Placoid Scale.
  - vii) Two general characters of order: marsupialia.
  - viii) Examples of connecting link and missing link.

[2]

**GROUP-B**

[12x4

**Answer All questions.**

2. Write distinguishing characters of Urochordata and describe the Larva at this group.

OR

Write notes on any TWO.

- a) General characters of Cephalochordata.
- b) Tornaria larva
- c) Brief note on Dipleurula concept.

3. Give a comparative account of petromyzon with Myxine.

OR

Write notes on any TWO.

- a) General characters of Cyclostomata.
- b) Tornaria Larva
- c) Advance features of vertebrates over protochordata.

4. Write an account of parental care in fishes with examples.

OR

Mention the general characters of class Reptilia and classify it upto order.

[3]

5. Enumerate aerial adaptations of Aves.

OR

Write notes on any TWO

- a) Dentition in mammals
- b) Affinities of Metatheria
- c) Distribution of Vertebrates in different realms (Brief note) .



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

**Sub.- ETC**  
**PAPER : Core - V**

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.*

1. Answer any SIX questions of the following [2 x 6]

- a) Find the Laplace transformation of 'cos at'.
- b) If  $f(x, y, z) = x^2 + y^2 + z^2$  find grad  $f$ .
- c) State Stoke's theorem.
- d) How do you know a given function is Analytic.
- e) If  $A = \begin{bmatrix} 3 & 4 \\ 3 & 4 \end{bmatrix}$ , then rank of matrix is \_\_\_\_.
- f) State Bay's theorem.
- g) What is the probability of 53 Monday in a leap year.
- h) Write the Axioms of probabilities.

**Answer Any FOUR questions.**

2. a) Solve by transformation

$$y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1 \quad [6]$$

[2]

b) Find the Fourier transform of

$$f(x) = \begin{cases} 1, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$$

Hence evaluate  $\int_0^{\infty} \frac{\sin x}{x} dx$

[6]

3 Find the div  $F$  and Curl  $F$  where

$$F = \text{grad} (x^3 + y^3 + z^3 - 3xyz)$$

[12]

4. Show that the function  $f(z) = \sqrt{|xy|}$  is not analytic at origin even though Cauchy-Reimann are satisfied.

[12]

5. Find the Eigen value and Eigen vector of the

matrix. 
$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

[12]

6. a) There are two bags  $B_1$  and  $B_2$  containing 4 red, 3 black balls and 2 red, 4 black balls respectively. If the ball drawn from a bag, selected at random is red, find the probability that the ball is drawn from the bag  $B_1$ .

[6]

b) If  $P(A) = 0.7$ ,  $P(B) = 0.8$  and  $P(A \cap B) = 0.6$  find  $P(A \cup B)$

[6]

[3]

7. What do you mean by rank of matrix. Find the rank of matrix :-

[12]

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$$



No. of Pages: 3

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

**Sub.- PSYCHOLOGY**  
**PAPER : Core-V**

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 of the following/short notes.**

- a) Distinguish between categorical and continuous variables.
- b) Write a short note on ogive.
- c) What is interval scale?
- d) Find out the medium for the following data.  
72, 74, 77, 53, 58, 63, 66, 82, 89, 69, 71
- e) What is Skewness?
- f) What is negative correlation?
- g) Mention the assumptions of ANOVA.
- h) What is nonparametric statistics?
- i) Write a short note on Type-II error.

[ 2 ]

**Group -B**

**Answer any FOUR questions.**

2. What is Histogram? Plot a histogram for the following data. [10+2]

Class Interval	Frequency
90-94	3
85-89	5
80-84	8
75-79	16
70-74	10
65-69	5
60-64	3
<hr/>	
N= 50	

3. Compute the mean, median and mode for the data given in question No. 2. [12]

4. What is standard deviation? Calculate the standard deviation for the following data

C.I	Frequency
80-84	1
75-79	2
70-74	2
65-69	5
60-64	12
55-59	7
50-54	5
45-49	2
<hr/>	
N= 36	

[ 3 ]

5. What is normal probability curve? Explain skewness and kurtosis. [12]

6. Calculate the Rank order correlation for the following data.

X	80	45	55	56	58	60	65	68	70	75	85
Y	82	86	50	48	60	62	64	65	70	74	90

7. The aim of an experimental study was to determine the effect of three different techniques of training on the learning of a particular skill. Three groups of student were given training through these different techniques . The following scores were obtained by them in a skill test. [12]

Gr1	3	5	3	1	7	3	6
Gr2	4	5	3	4	9	5	5
Gr3	5	5	5	1	7	3	7

Test the difference between groups by applying ANOVA. [12]

8. Write notes on:  
 a) Assumption and use of menn Whitney U test.  
 b) Purpose and assumption of ANOVA.



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

Sub: MATHEMATICS

Full Marks: 80

Paper: CORE-V

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) Evaluate  $\lim_{n \rightarrow \infty} (\sqrt{4n^2 + 2} - 2n)$

(b) Prove that  $\lim_{x \rightarrow 0} (3x + 2)$

(c) State the Bolzano-Weierstrass theorem.

(d) Evaluate  $\lim_{x \rightarrow 0} \frac{2x - \sin 2x}{3x}$

(e) Examine the validity of Rolle's theorem for

$$f(x) = x |x+2| \text{ for } x \in [-2, 0)$$

(f) Check the differentiability of  $f(x) = \frac{x+2}{|x+2|}$  at  $x=2$ .

(g) Define uniform continuity with example.

(h) Define critical point with example.

(i) State Taylor's theorem to inequalities.

(j) Write down the Maclaurin's series of  $e^{2x}$ .

**Answer any FOUR questions.**

2. (a) State and prove Cauchy's general principle of convergence for sequence.

[8]

(P.T.O...)

[2]

(b) If  $\{a^n\}$  be a sequence, such that  $\lim_{n \rightarrow \infty} \frac{a_{n+1}}{a_n} = l > 1$ , then [8]

prove that  $\lim_{n \rightarrow \infty} a_n = \infty$ . Hence prove

that  $\lim_{n \rightarrow \infty} \frac{x^n}{n!} = 0$ .

3. (a) Examine the continuity of following at  $x=0$ . [8]

$$f(x) = \begin{cases} \frac{e^{1/x} - e^{-1/x}}{e^{1/x} + e^{-1/x}} & \text{when } x \neq 0 \\ 1 & \text{when } x = 0 \end{cases}$$

(b) If a function  $f$  is continuous on a closed interval  $[a, b]$ , then prove that  $f$  attains its bounds at least once in  $[a, b]$ . [8]

4. (a) Prove that  $f(x) = \frac{1}{x}$  is not uniformly continuous on  $(0, 1]$  [8]

but  $g(x) = x^2$  is uniformly continuous on  $[-1, 1]$ .

(b) Find if  $Lf(0)$  and  $Rf(0)$  for the functions [8]

$$fx = \begin{cases} \frac{x(e^{1/x} - 1)}{e^{1/x} + 1}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

where  $Lf(0)$  = Left hand derivative and

$Rf(0)$  = Right hand derivative

[3]

5. (a) Prove that  $x - \frac{x^2}{2} < \log(1+x) < x - \frac{x^2}{2(1+x)}$  for all  $x > 0$ . [8]

(b) State and prove Cauchy mean value theorem. [8]

6. (a) Prove that [8]

$$\tan^{-1} x = \tan^{-1} \frac{\pi}{4} + \frac{x - \pi/4}{1 + \pi^2/16} - \frac{\pi(x - \pi/4)^2}{4(1 + \pi^2/16)^2} + \dots$$

(b) Examine the function  $(x-3)^5 (x+1)^4$  for extrem values. [8]

7. (a) Evaluate  $\lim_{x \rightarrow 0} \frac{e^{-2} 2 \cos x + e^{-x}}{x \sin x}$  [8]

(b) Prove that the maximum value of  $\left(\frac{1}{x}\right)^x$  is  $e^e$ . [8]

8. Write short notes on (any Two). [8+8]

(a) Convergence criteria

(b) Preservation of interval

(c) Relative Extremum

(d) Indeterminate forms



No. of Pages: 3

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

**Sub.- ECONOMICS**  
**PAPER : Core-V**

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 questions.**

[2 x 8

- a) What are the fundamental problems of an economy?
- b) What is the unit of measurement of utility? Can utility be negative? Justify with reason.
- c) Differentiate between demand curve and demand schedule, with example.
- d) Differentiate between consumer's surplus & producer's surplus.
- e) Diagrammatically, with example show indifference curve for project substitute and perfect complementary goods.
- f) Why MRTs is called slope of Isoquant?
- g) Which sector of Indian economy mostly faces diminishing returns and why?
- h) What is planning curve? Why is it called so?
- i) What are ridge lines?

*P.T.O.*

[ 2 ]

- j) Give suitable examples for :
- (i) Implicit cost      (ii) Explicit cost
  - (iii) Opportunity cost      (iv) Semi variable cost

**Answer any FOUR questions.**

2. a) What is indifference curve? Discuss the properties of indifference curve.
- b) What is the difference between cost minimisation and expenditure minimisation? How can expenditure be minimised in Indian industrial sector?
3. a) Taking your own numerical values & show the difference in elasticity when calculated using
- (i) Point method      (ii) Arc method
  - (iii) Mid point method      (iv) Percentage method.
- Which method you think yields the best result. Why.
- b) Diagrammatically elaborate Hick's compensated demand curve.
4. a) Why law of variable proportion operates in Indian agriculture? Do you think corporate farming can reduce farmer's distress in India?
- b) What is Cobb-Douglas production function? Do you think the powers of Labour and capital is always equal to one, when added? If not, why?

[ 3 ]

5. a) Why are cost curves U shaped?
- b) Write short notes on:
- i) Economics of scope
  - ii) Economics of scale
6. a) How does a firm maximises its project in the short run in any competitive market?
- b) Write short notes on:
- i) Properties of project function
  - ii) Revenue functions
7. What is the relation between price effect, income effect and substitution effect? Elaborate diagrammatically.
8. a) What are the various types of costs? Explain with suitable examples.
- b) What do you understand by shift in cost? How does it affect a firm in the short & long run.



**+3 3<sup>rd</sup> SEMESTER EXAMINATION-2019  
(COMMERCE)**Sub.- Business Mathematics  
PAPER : Core-VTime: 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.** [2 x 8]

- a) Evaluate  $\int 5x^3 dx$
- b) Triangular matrix?
- c)  $\int 9x^{-2} dx$ , Evaluate.
- d) Define 'unboundedness' in L.P.P.
- e) What do you mean by 'Pessimistic time'?
- f) Explain the meaning of 'crashing' in Newton Techniques.
- g) Find the product of the matrix

$$K = 4, A = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \end{pmatrix}$$

- h) What is maxima?
- i) What is sinking fund?
- j) How can we find out the present value?

[2]

**Answer Any FOUR questions.**

[16 x 4]

2. Narrate the different types of matrix with suitable illustrations.
3. a) Evaluate  $\int x^2 \cdot e^{ax} \cdot dx$   
 b) Evaluate  $\int (1+x)e^x \cdot dx$
4. Solve through Cramer's rule  
 $3x - 4y + 5z = -6$   
 $x + y - 2z = -1$   
 $2x + 3y + z = 5$
5. An annuity payable at the end of the year for 10 years at 12% p.a. compound amount to Rs. 171542. Determine the value of such annuity.
6. a) Find the inverse of the following matrices.

$$\begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{pmatrix}$$

- b) The following table shows the job network alongwith their time estimates.

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	3	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

- i) Draw the project network.  
 ii) Find the critical path.

[3]

7. **Answer any FOUR.**

- a) Define Annuities  
 b) P.E.R.T.  
 c) Learning Curve  
 d) Amortisation of principal  
 e) Diagonal matrix  
 f)  $\int 10yx \cdot dx$ .
8. a) The value of a machine depreciates at 10% p.a. If the present value is Rs. 40,000. Find the value 3 years ago.  
 b) Find  $\frac{dy}{dx}$  from the following implicit functions:  
 $x^5 + y^5 = 5ax^2 \cdot y^2$



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

Sub: MTC

Full Marks: 80

Paper: CORE-V

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) Find the limit point of  $\left\{ \frac{3n + 2n^2}{2 + 5n^2}, n \in \mathbb{N} \right\}$ (b) Prove that  $\lim_{n \rightarrow \infty} \frac{7n - 3}{2 - 3n} = -\frac{7}{3}$ (c) Prove that  $f(x) = |2x + 1|$  is not derivable at  $x = -\frac{1}{2}$ 

(d) State Bolzano-Weierstrass theorem.

(e) Prove that  $\frac{\sin x}{x} < 1$  for  $x \in (0, \pi/2)$ (f) Write the Maclaurin's series of  $\cos 2x$ .(g) Evaluate  $\lim_{x \rightarrow 0} \frac{x + \tan 2x}{x}$ 

(h) State Taylor's theorem with Lagrange's form of remainder.

(i) Define convex function with example.

(j) Test  $\lim_{x \rightarrow 0} \frac{|x|}{x}$  exist or not.

[6]

(P.T.O...)

[2]

**Answer any FOUR questions.**

2. (a) Evaluate the following limits

[4+4]

$$(i) \lim_{n \rightarrow \infty} \frac{(3n+2)(2n-1)}{n(3n+5)}$$

$$(ii) \lim_{n \rightarrow \infty} (\sqrt{2n+1} - \sqrt{n})$$

(b) State and prove Cauchy general principle of convergence. [8]

3. (a) State and prove Cauchy's first theorem on limits. [8]

(b) Test the continuity of the function [8]

$$f(x) = \begin{cases} e^{1/x} - 1, & \text{when } x \neq 0 \\ 1, & \text{when } x = 0 \end{cases}$$

4. (a) State and prove Darboux's theorem. [8]

(b) Prove that  $\frac{v-u}{1+u^2} < \tan^{-1} v - \tan^{-1} u < \frac{v-u}{1+u^2}$  if [8]

$$0 < u < v \text{ and deduce that } \frac{\pi}{4} + \frac{3}{25} < \tan^{-1} \frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$$

5. (a) State and prove Cauchy mean value theorem. [8]

(b) Assuming the validity of expansion prove that [8]

$$e^x \cos x = 1 + x - \frac{2x^3}{3!} - \frac{2^2 x^4}{4!} - \frac{2^2 x^5}{5!} + \dots$$

[3]

6. (a) Prove that  $\frac{\tan x}{x} > \frac{x}{\sin x}$ , for  $0 < x < \frac{\pi}{2}$ . [8](b) Derive Lagrange's mean value theorem by considering the derivable function  $\phi(x) = f(x) - f(a) - A(x-a)$  [8]7. (a) Prove that between any two real roots of  $e^x \sin^x = 1$  there is at least one real root of  $e^x \cos^x + 1 = 0$ . [8](b) Find the Taylor's series expansion of  $e^{2x}$  about  $x = \frac{1}{4}$ . [8]

8. Write short notes on (any two). [8+8]

(a) Sequential criterion for continuity.

(b) Uniform continuity

(c) Relative extremum.

(d) Applications of Rolle's theorem.

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

**Sub: STATISTICS**

Full Marks: 60

**Paper: CORE-V**

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**

**1. Answer any SIX questions.**

[2x6]

- (a) When Bernoulli distribution follows Binomial distribution?
- (b) Write the conditions that Binomial distribution converted to Poisson distribution.
- (c) State the three area properties for a standard normal variate.
- (d) What are the mean and variances of Beta distribution?
- (e) Define Chi-square distribution.
- (f) What are the exact sampling distributions? Write the p.d.f. of one of those distributions.
- (g) State the Weak law of Large Numbers?
- (h) Write the Binomial WLLNs.
- (i) What is central limit theorem?
- (j) How Chebychev's inequality is linked with WLLN?

**GROUP-B**

**Answer any FOUR questions.**

2. (a) Derive Binomial distribution. Obtain its moments and hence study the nature of the distribution.

[6]

(P.T.O...)

[2]

(b) If X and Y are two independent Poisson variates with parameters  $\lambda$  and  $\theta$  respectively, find the probability distribution of  
i)  $X + Y = k$       ii)  $X = Y$ .

OR

(c) Define Hyper-geometric distribution. Obtain its mean and variance. If total number of objects tend to infinity, prove that Hyper-geometric distribution tend to Binomial distribution.

3. (a) Discuss Rectangular distribution. Obtain its mean and variance and hence find mean deviation from mean?

(b) The daily consumption of milk in a city in excess of 20,000 gallons is approximately distributed as Gamma variate with parameters 2 and 1/10,000. The city has a daily stock of 30,000 gallons. What is the probability that the stock is insufficient on a particular day?

OR

(c) For a distribution with density  $\frac{1}{\pi(1+x^2)}, -\infty < x < \infty$ , obtain quartiles and mode of this distribution.

(b) Find out median of Normal distribution.

4. Define Chi-square variate with 1 *df.* and *n df.* Obtain its mean, variance, Karl Pearson's coefficient of Skewness. Discuss its properties.

OR

Derive Student's *t*-distribution. Write the features of *t*-curve. Discuss its properties, central values and Skewness and Kurtosis.

[3]

5. Derive Chebychev's inequality for continuous variate. Discuss Weak Law of Large Numbers (WLLN). Mention its relationship with them.

OR

(a) For the number of points X on a die, prove that Chebychev's inequality gives  $P[|X - E(X)| > 2.5] < 0.47$ , while the actual probability is nearly zero.

(b) If  $X_i$  assumes the values  $i$  and  $-i$  with equal probabilities. Show that the law of large numbers cannot be applied to the independent variables  $X_1, X_2, X_3, \dots, X_n$ .

6. (a) Write one relation between Central limit theorem and Weal law of large numbers.

(b) Let  $X_1, X_2, \dots, X_n$  be I.d. Poisson's variates with parameter  $\lambda$ . Estimate.  $P(110 \leq S_n \leq 120)$  using Central Limit Theorem, where  $S_n = X_1 + X_2 + \dots + X_n; \lambda = 2$  and  $n = 50$ .

OR

(c) State the Lindeberg-Levy Central limit theorem.

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