



36402

**IV Semester B.Sc./B.C.A. Degree Examination,
September/October 2020**

ಬೇಸಿಕ್ ಕನ್ನಡ

Paper IV – ಗರತಿಯ ಹಾಡುಗಳು ಮತ್ತು ಯಶೋಧರ ಚರಿತೆ

(CBCS)

Time : 3 Hours

Max. Marks : 70

ಭಾಷೆ ಹಾಗೂ ಬರಹದ ಶುದ್ಧಿಗೆ ಗಮನ ಕೊಡಲಾಗುವುದು.

1. (a) ಗರತಿಯ ಹಾಡುಗಳಲ್ಲಿ ಗೆಳತಿಯ ರೂಪವರ್ಣನೆಯನ್ನು ಕುರಿತು ಬರೆಯಿರಿ.
ಅಥವಾ
(b) ಗರತಿಯ ಹಾಡುಗಳಲ್ಲಿ ಸತಿಯ ಬಗ್ಗೆ ಪತಿಗೆ ಇರುವ ಭಾವನೆಗಳನ್ನು ಚಿತ್ರಿಸಿ. (10)
2. (a) ಗರತಿಯ ಹಾಡುಗಳಲ್ಲಿ ಮಾತೃ ಪ್ರೇಮವು ಹೇಗೆ ವ್ಯಕ್ತವಾಗಿದೆ?
ಅಥವಾ
(b) ಗೆಳತಿಯ ಸ್ನೇಹದ ಸವಿ ನೆನಪುಗಳನ್ನು ವಿವರಿಸಿ. (10)
3. (a) ಯಶೋಧರನು ಏಕೆ ವೈರಾಗ್ಯ ಹೊಂದಿದನು? ವಿವರಿಸಿ.
ಅಥವಾ
(b) ದೂತಿಯು ಅಷ್ಟಾವಂಕನ ಬಗ್ಗೆ ವ್ಯಕ್ತಪಡಿಸಿದ ಭಾವನೆಗಳನ್ನು ತಿಳಿಸಿ. (10)
4. (a) ಅಭಯರುಚಿ ಅಭಯಮತಿ ಯಾರು? ಅವರು ಮಾರಿದತ್ತನ ಮನಸ್ಸನ್ನು ಹೇಗೆ ಪರಿವರ್ತಿಸಿದರು?
ಅಥವಾ
(b) ಯಶೋಧರನು ಹಿಟ್ಟಿನ ಕೋಳಿಯನ್ನು ಏಕೆ ಕೊಂದನು? ಮತ್ತು ಈ ಪಾಪದ ಫಲವನ್ನು ಹೇಗೆ ಅನುಭವಿಸಿದನು? (10)
5. (a) ತವರು ಮನೆಯ ಸವಿ ನೆನಪುಗಳನ್ನು ಕುರಿತು ಬರೆಯಿರಿ.
ಅಥವಾ
(b) ಪತಿಯ ಬಗ್ಗೆ ಸತಿಗೆ ಇರುವ ಪ್ರೀತಿಯ ಬಗ್ಗೆ ತಿಳಿಸಿ. (5)
6. (a) ಯಶೋಧರನು ಅಮೃತಮತಿಯನ್ನು ಏಕೆ ಕೊಲ್ಲಲಿಲ್ಲ?
ಅಥವಾ
(b) ಸುದತ್ತಾಚಾರ್ಯರು ಯಾರು? ಅವರ ಉಪದೇಶದ ಮುಖ್ಯ ವಿಚಾರಗಳನ್ನು ಬರೆಯಿರಿ. (5)

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7. ಈ ಕೆಳಗಿನ ವಿಷಯಗಳಲ್ಲಿ ಯಾವುದೇ ನಾಲ್ಕಕ್ಕೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ :

(4 × 5 = 20)

- (a) ಜನ್ಮ
 - (b) ಚಂಡಕರ್ಮ
 - (c) ಚಂದ್ರಮತಿ
 - (d) ಯಶೋಧರ
 - (e) ತವರು ಮನೆಯ ಕಹಿ ನೆನಪುಗಳು
 - (f) ಗರತಿಯ ಹಾಡುಗಳಲ್ಲಿ ಹಾಸ್ಯ
 - (g) ಗರತಿಯ ಹಾಡಿನಲ್ಲಿ ತಂದೆ
 - (h) ಗರತಿಯ ಹರಕೆಗಳು (ಆಶೀರ್ವಾದಗಳು)
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**IV Semester B.A./B.Sc./B.Com./B.B.M./B.S.W./G.M.T./B.C.A.
Degree Examination, September/October 2020**

ENGLISH

Paper IV – Basic English

(CBCS – New –2016-17)

Time : 3 Hours

Max. Marks : 70

- Texts :** 1) *The Apprentice*
2) *Composition*

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

- (a) I remember what my mother said,
“You fool” she said “what right had
you? what right?”
- (b) Overnight everyone knew that I had
neither job nor money.
- (c) You are on the way up Rathod, I
heard someone say, one afternoon at lunch.
- (d) The men who have died have died.
And even if it were to do good, why
should I go and confess?

II. Write short notes on **any two** of the following : (2 × 4 = 8)

- (a). Ratan Rathod’s mother
- (b) The rally in which Ratan’s father died.
- (c) Shiekh Himmat Singh’s family.
- (d) Ratan Rathod’s experience in Jail.

III. Answer **any two** of the following : (2 × 15 = 30)

- (a) What is the basic conflict in Arun Joshi’s novel ‘The Apprentice’?
- (b) Sketch the character of the Brigadier.

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- (c) How does Arun Joshi's novel provide a contract between the ideals of freedom and the reality of Indian independence?
- (d) How does Ratan Rathod signify the crisis of the Indian character?
- IV. Write a dialogue on the situation where a student goes to the KSRTC to get his monthly, Bus Pass for concessional rates. **(1 × 8 = 8)**
- V. Expand **any one** of the following : **(1 × 8 = 8)**
- (a) Speech is silver, silence is golden
 - (b) Empty vessels make more noise
 - (c) Don't judge a book by its cover
- VI. Write a general essay on **any one** of the following : **(1 × 8 = 8)**
- (a) Unemployment
 - (b) Corona virus (COVID-19)
 - (c) Crisis in economy



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**IV Semester B.Sc./B.C.A./B.F.T. Degree Examination,
September/October 2020**

ENGLISH

Paper IV – Basic English

(CBCS – New – 2017-18)

Time : 3 Hours

Max. Marks : 70

- Texts :**
- 1) *The Old Man and the Sea – Ernest Hemingway.*
 - 2) *Communication and Analysis Skills – Ashan Academy.*

I. Annotate **any two** of the following : **(2 × 6 = 12)**

- (a) He always, thought of the sea as 'la mar' which is what people call her in Spanish when they love her,
Sometimes those who love her say bad things of her but they are always said as though she were a woman.
- (b) Most people were heartless about turtles because a turtle's heart will beat for hours after it has been cut up and butchered,
But the old man thought, I have Such a heart too.
- (c) But man is not made for defeat ...
A man can be destroyed but not defeated.

II. Write short notes on **any two** : **(2 × 6 = 12)**

- (a) Santiago's time in the tavern at Casablanca
- (b) Manolin
- (c) DiMaggio

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III. Answer **any one** of the following :

(1 × 10 = 10)

- (a) Describe Santiago's fight with the Marlin and his Battle with the Sharks.
- (b) How does Ernest Hemmingway's "The Old Man and the Sea" convey the relationship between man and nature?

IV. Answer **any six** of the following :

(6 × 6 = 36)

- (a) Why is Etiquette important in daily life?
- (b) What is a suitable dress code for formal occasions?
- (c) How can one use audio visual media in presentations?
- (d) How does eye contact help in understanding an audience?
- (e) Give any four examples of behaviour to be avoided while working in a team.
- (f) Write a note on gender bias in communication.
- (g) How do personal conduct and appearance create an impression?
- (h) Serial order presentation.



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**IV Semester B.Sc./B.C.A. Degree Examination,
September/October 2020**

HINDI (Basic)

Paper IV – Study of Indian Language

Time : 3 Hours

Max. Marks : 70

सूचना : लिखावट शुद्ध और देवनागरी लिपि में हों।

पठित पुस्तकें : 1. संशय की एक रात, 2. जनसंचार माध्यम और हिन्दी

1. किन्हीं दो की संदर्भ सहित व्याख्या कीजिए। (2 × 10 = 20)

- (a) मित्रो! सीतामाता भलेही राम की पत्नी हो,
किसी की वधु, किसी की दुहिता हों, पर
हम कोटी-कोटी जनों की यो केवल प्रतीक है-
- (b) चलने पर संभव है, तीर्थ मिले, चामर की छाँव मिले।
संभव है पसली में बाण फ़ँसे, प्यासे दस तोड़ें,
चीलों से आखिर तक युद्ध करें जीवन हित।
- (c) हम आत्माएँ है। संबंध हीन, बोधहीन आत्माएँ
हमारे निकट कृतज्ञता या आभार जैसी भाषा का कोई अर्थ नहीं
फ़िर भी तुष्ट हूँ वत्स! तुम्हारा कल्याण हो।

2. किन्हीं दो प्रश्नों के उत्तर लिखिए। (2 × 10 = 20)

- (a) संशय की एक रात काव्य का आशय पने वाक्य में लिखिए।
- (b) संशय की एक रात खंड काव्य में आजकी समस्याओं को कैसे प्रस्तुत किया गया है समझाइए।
- (c) संशय की एक रात खंड काव्य में हनुमान का व्यक्तित्व चित्रण कैसे हुआ है स्पष्ट कीजिए।

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3. किन्हीं दो प्रश्नों का उत्तर लिखिए।

(2 × 10 = 20)

- (a) जनसंचार माध्यम की परिभाषा देते हुए उसकी विशेषताओं पर प्रकाश डालिए।
- (b) जनसंचार माध्यम में इंटरनेट का महत्व स्पष्ट कीजिए।
- (c) समाचार माध्यम में दूरदर्शन का महत्व समझाइए।

4. किन्हीं दो पर टिप्पणी लिखिए।

(2 × 5 = 10)

- (a) रेडियो
 - (b) समाचार पत्र
 - (c) विभीषण
 - (d) जटायु
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**IV Semester B.A./B.Com./B.B.A./B.Sc.(Non-Computer Science)
Degree Examination, September/October 2020**

COMPUTER SCIENCE

Paper 4.3 – Computer Applications

(CBCS)

Time : 3 Hours

Max. Marks : 70

SECTION – A

- I. Answer **any ten** from the following : **(10 × 2 = 20)**
1. Who is the developer of C language?
 2. What is identifier?
 3. Define Variable.
 4. Write any two arithmetic operators in C.
 5. Evaluate $X = 4*(2 + 3) - (8-4/2)$.
 6. Write the symbols of increment and decrement operators in C.
 7. Write the syntax of scanf() function.
 8. Convert 45 to binary.
 9. What is logic gate?
 10. Find 1's complement of 1110111.
 11. Expand WWW.
 12. What is Internet?

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SECTION - B

II. Answer **any four** from the following :

(4 × 5 = 20)

13. Write the characteristics of C language.
14. What is Constant? Write different types of it.
15. Explain Relational operators with suitable example.
16. Write a C program to find simple interest.
17. Explain AND gate with truth table.
18. Write a note on E-mail.

SECTION - C

III. Answer **any three** from the following :

(3 × 10 = 30)

19. Write the basic structure of C program with suitable example.
20. Explain any five mathematical functions with suitable example.
21. Write a C program to find area and circumference of circle.
22. Subtract the following :
 - (a) 1110 - 1010 using 1's complement method
 - (b) 1100 - 1110 using 2's complement method
23. What is Network? Explain any two types of network.



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IV Semester B.Sc. Degree Examination, September/October 2020

CHEMISTRY

Paper IV

(CBCS – New)

Time : 3 Hours

Max. Marks : 70

- Instructions :**
- 1) Sections – **A** contains questions from Inorganic Chemistry, Organic Chemistry and Physical Chemistry.
 - 2) Section – **B** contains questions from Inorganic Chemistry, Section – **C** contains questions from Organic Chemistry, Section – **D** contains questions from Physical Chemistry.
 - 3) Answer all the Sections.

SECTION – A

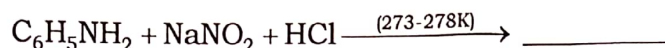
Answer **any ten** of the following :

(10 × 1 = 10)

1. Write the IUPAC name of $K_4[Ni(CN)_4]$.
2. Give an example for hexadentate ligand.
3. What is the crystal field energy for d^6 configuration in low and high spin complexes?
4. Give an example for camprotonation.
5. Complete the reaction
$$CH_2 = CH_2 + \frac{1}{2} O_2 \xrightarrow[250^\circ C]{Ag} \underline{\hspace{2cm}}$$
6. Which of the following reagents will readily react with 400 lts aldehydes and ketones?
(a) Grignard reagent (b) Fehling's solution
(c) Tollen's reagent (d) Schiff's reagent
7. Arrange $C_6H_5NH_2$, $C_6H_5NHCH_3$ and $C_6H_5N(CH_3)$ in the decreasing order of Basicity.



8. Complete the reaction :



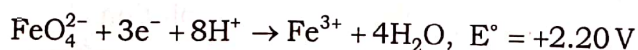
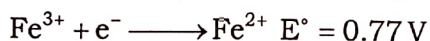
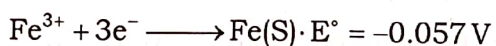
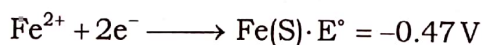
9. What are the values of volume of mixing and enthalpy of mixing for non ideal solutions which deviates positively?
10. Determine the number of phases and components in $\text{KCl}-\text{NaBr}-\text{H}_2\text{O}$ system.
11. Define molar depression in freezing point constant.
12. Define latent heat of fusion.

SECTION - B

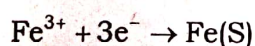
Answer **any two** of the following :

(2 × 10 = 20)

13. (a) Write the important postulates of Werner's coordination theory and explain the octahedral complex formation in $\text{CoCl}_3 \cdot 5\text{NH}_3$. (6)
- (b) Square planar complex with coordination number four exhibit geometrical isomerism where as tetrahedral complex does not? Explain with an example. (4)
14. (a) Describe the bonding in $[\text{Fe}(\text{CN})_6]^{3-}$ by Valence band and crystal field theory. (6)
- (b) Explain the low spin complex formation in $[\text{Co}(\text{CN})_6]^{3-}$ by crystal field theory. (4)
15. (a) From the data :



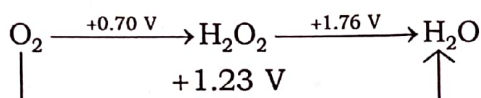
Construct the Latimer diagram and calculate the standard electrode potential for the change.



(6)



(b) From the Latimer diagram.



Construct Frost diagram for oxygen. Predict which species is thermodynamically stable and undergo disproportionation. (4)

SECTION - C

Answer **any two** of the following questions : (2 × 10 = 20)

16. (a) Narrate the mechanism of Cannizzaro's reaction. (6)
 (b) Explain the methods of preparation of epoxides by
 (i) Distillation of ethylene chlorohydrins
 (ii) Alkene (4)
17. (a) Describe the mechanism of Aldol condensation. (6)
 (b) Give the condensation reactions of Aldehydes and ketones with hydroxyl amine and phenyl hydrazine. (4)
18. (a) Give the diazo coupling reactions with phenol, primary and tertiary amines. (6)
 (b) Give the preparation of primary secondary and tertiary amines from alkyl halides. (4)

SECTION - D

Answer **any two** of the following : (2 × 10 = 20)

19. (a) With the aid of boiling point composition and vapour pressure composition diagrams explain the principle of fractional distillation of low boiling azeotropic liquid mixtures with an example. (6)
 (b) Explain with a diagram a system having upper critical solution temperature. (4)
20. (a) Draw and explain a phase diagram for one component system comprising only one solid phase. (6)
 (b) Describe the phase diagram of a system of Zn and Mg. (4)

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21. (a) Derive the relation between elevation in boiling point of a dilute solution and the mole fraction of the solute. How this expression is used to determine the molar mass of a non volatile solute. (6)
- (b) The molar heat of vaporisation of water at 100°C is 40.585 kJ . At what temperature will a solution containing 5.60 g of glucose per 1000 g of water boil? ($R = 8.314\text{ J/K/mole}$) (4)

IV Semester B.Sc. Degree Examination, September/October 2020

CHEMISTRY

Paper IV

(New Syllabus)

Time : 3 Hours

Max. Marks : 80

Instructions : 1) Sections **A** contains questions from Inorganic, Organic and Physical Chemistry.

2) Section **B**, **C** and **D** respectively contains questions from Inorganic, Organic and Physical Chemistry.

3) Answer **all** questions.

SECTION - A

Answer **any ten** of the following :

(10 × 2 = 20)

1. Write the structure of $[\text{Cu}(\text{NH}_2 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2)_2]$.
2. Write all possible geometrical isomers of $[\text{Pt}(\text{NH}_3)_2\text{ClNO}_2]$.
3. Give an example for an inner sphere complex.
4. Give an example for disproportionation reaction.
5. What are the products when ethyl alcohol reacts with con. H_2SO_4 at 140°C ?
6. Complete the reaction
 $2\text{C}_6\text{H}_5\text{CHO} + \text{NaOH} \rightarrow ? + ?$
7. Arrange in the decreasing order of basicity.
P-nitroamine, P-Toluidine and aniline
8. What happens when an aqueous solution of diazonium chloride is acidified and heated strongly?
9. Define Raoult's law. Give an example for an ideal solution.

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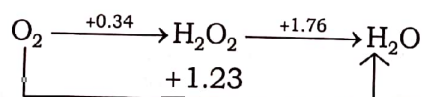
10. Determine the number of phases and components when NH_4Cl is heated in a closed vessel.
11. For a one component system, predict the minimum and maximum number of phases and degrees of freedom.
12. What is meant by the elevation in boiling point constant for water is 0.514 K Kg/mol ?

SECTION - B

Answer **any two** of the following :

(2 × 10 = 20)

13. (a) Write the postulates of Werner's coordination theory. How does it account for non-ionic nature of $\text{CoCl}_3 \cdot 3\text{NH}_3$ complex? (6)
(b) Discuss any two types of geometrical isomers in octahedral complexes. (4)
14. (a) How does the Valence bond theory account for the fact that $[\text{CoF}_6]^{3-}$ is paramagnetic while $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic? (6)
(b) Give the sequence of energy levels of 'd' orbitals in tetrahedral crystal field. (4)
15. (a) Discuss the redox stability in water with a diagram. (6)
(b) What is Frost diagram? Construct a Frost diagram from the Latimer diagram given below : (4)



SECTION - C

Answer **any two** of the following :

(2 × 10 = 20)

16. (a) Give the mechanism of Perkin's reaction. (6)
(b) Give the ring opening reactions of epoxid with H_2O , HCl and HCN in acidic media. (4)
17. (a) Explain the mechanism of aldol condensation. (6)
(b) Give an preparation of amines by alkyl halides, alcohols and phthalinide. (4)
18. (a) Reduction of nitrobenzene under different conditions yields different products. Give three examples. (6)
(b) Give the coupling reactions of diazonium chloride with phenol, primary and tertiary amines. (4)



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SECTION - D

Answer **any two** of the following :

(2 × 10 = 20)

19. (a) How many types of real solutions present? Draw and explain the Vapour pressure - composition and boiling point - composition diagrams of all the types with an example. (6)
- (b) With a neat diagram explain the partially miscible liquids with upper CST. (4)
20. (a) Describe the phase diagram of potassium iodide and water system. (6)
- (b) Derive Gibb's phase rule. (4)
21. (a) Derive the relation between the depression in freezing point of a solution with the molar mass of the solvent. (6)
- (b) 1.51 gm of NaCl was dissolved in 500 gm of water and the elevation in boiling point was observed to be 0.0514°C . Calculate the Vant Hoff factor. K_b for water is $0.514 \text{ K Kg mol}^{-1}$. (4)



IV Semester B.Sc. Degree Examination, September/October 2020

MATHEMATICS – VII

Paper 4.1 – Topology and Real Analysis

(Old)

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **any ten** of the following :

(10 × 2 = 20)

1. Define topology on a set.
2. Define closure of a set with an example.
3. Define neighbourhood of an element X of a topological space (X, τ) .
4. Let (X, τ) be a discrete space and $A \subset X$ find $\partial(A)$.
5. Define base for a topology with an example.
6. Define fuzzy subset with an example.
7. Define T_1 and T_2 spaces.
8. Define interior point and exterior point of a set.
9. Define upper and lower Darboux sums.
10. Define norm and refinement of a partition.
11. Prove that the lower Riemann integral cannot exceed upper Riemann integral.

12. Let $Y = \left\{ \frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4} \right\}$

$$\text{Let } A = \left\{ \left(\frac{1}{1}, 0.1 \right), \left(\frac{1}{2}, 0.9 \right), \left(\frac{1}{3}, 0 \right), \left(\frac{1}{4}, 1 \right) \right\}$$

$$B = \left\{ \left(\frac{1}{1}, 0.6 \right), \left(\frac{1}{2}, 0.8 \right), \left(\frac{1}{3}, 0.7 \right), \left(\frac{1}{4}, 1 \right) \right\}$$

Be two fuzzy subsets of y then find $A \cup B$ and $A \cap B$.

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SECTION - B

Answer **any four** of the following :

(4 × 5 = 20)

13. Let (X, τ) be a topological space. Prove that a subset A of X is open iff A' is closed.
14. Let (X, τ) be a topological space. A, B be subsets of X then prove that
- (a) $A \subset \bar{A}$
 - (b) \bar{A} is closed
 - (c) A is closed iff $A = \bar{A}$
15. Let (X, τ) be an indiscrete space. Let A be non empty proper subset of X find $A^o, (A')^o, \partial(A)$.
16. Let (X, τ) be a topological space, $x \in X$ and N_1 and N_2 be the neighbourhoods of X then prove that $N_1 \cap N_2$ is also a neighbourhood of X .
17. Let $X = \{a, b, c, d\}$, $\tau = \{\phi, x, \{a\}, \{b\}, \{a, b\}\}$ be a topology on X if $A = \{b, c\}$, $B = \{c, d\}$ $C = \{a, b\}$ Find $\bar{A}, \bar{B}, \bar{C}$.
18. Let R be the set of all real numbers and u be a family of subsets of ' R ' defined as follows :
- A subset ' A ' of R belongs to ' u ' if either
- (a) $A = \phi$ or
 - (b) if A is non-empty then for every $X \in A$, \exists an open interval I such that $X \in I \subset A$ then prove that u is a topology on R .

SECTION - C

Answer **any four** of the following :

(4 × 5 = 20)

19. Let A, B be any two fuzzy subsets of a set X . Let $\alpha, \beta \in [0, 1]$ then prove that
- (a) $\alpha_{(A \wedge B)} = \alpha_A \cap \alpha_B$
 - (b) $\alpha_{(A \vee B)} = \alpha_A \cup \alpha_B$
20. Let $f : X \rightarrow Y$ be a function A be a fuzzy subset of X . B be fuzzy subset of Y then prove that $f^{-1}(1 - B) = 1 - f^{-1}(B)$.



21. State and prove necessary condition for a bounded function to be R -integrable.
22. If $f(x)$ is R -integrable $[a, b]$ then prove that $|f|$ is also R -integrable in $[a, b]$.
23. If f is defined in $[0, 1]$ by $f(x) = x \quad \forall x \in [0, 1]$ then prove that $f \in R[0, 1]$ and $\int_0^1 f(x) dx = \frac{1}{2}$.
24. If $f, g \in R[a, b]$ then prove that $(f + g) \in R[a, b]$ and

$$\int_a^b (f + g)(x) dx = \int_a^b f(x) dx + \int_a^b g(x) dx.$$



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MATHEMATICS – VII

Paper 4.1 – Real Analysis and Complex Analysis

(CBCS – New)

Time : 3 Hours

Max. Marks : 60

Instructions : Answer **all** Sections.

SECTION – A

Answer **any ten** questions :

(10 × 2 = 20)

1. Define upper and lower Darboux sums.
2. If $f, g \in R[a, b]$ then show that $f \cdot g \in R[a, b]$.
3. Prove that the lower Riemann integral cannot exceed upper Riemann integral.
4. If $f(x) = x$ on $[0, 1]$ and $P = \left\{0, \frac{1}{3}, \frac{2}{3}, 1\right\}$. Find upper Darboux sum and lower Darboux sum.
5. Show that $\int_1^2 x^3 dx = \frac{15}{4}$ by fundamental theorem of calculus.
6. Define Bilinear transformation.
7. Show that $\arg(\bar{z}/z) = \pi/2$ represents a line through the origin.
8. Show that $f(z) = e^z$ satisfies ER equations.
9. Show that $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ is harmonic.
10. Evaluate $\int_C (\bar{z})^2 dz$ around the circle $|z| = 1$.
11. Evaluate $\int_0^{3+i} z^2 dz$ along the line $3y = x$.
12. Evaluate $\int_C \frac{1}{z(z-1)} dz$ where 'C' is $|z| = 2$.



SECTION - B

Answer **any two** of the following :

(2 × 5 = 10)

13. If $f(x)$ is continuous function defined on $[a, b]$ then prove that $f(x)$ is R -integrable.
14. State and prove fundamental theorem of integral calculus.
15. If $f \in R [a, b]$ then prove that $|f| \in R [a, b]$.

SECTION - C

Answer **any three** questions :

(3 × 5 = 15)

16. State and prove sufficient condition for $f(z)$ to be analytic.
17. Find the analytic function $f(z) = u + iv$ given that $u + v = e^x(\cos y + \sin y)$.
18. Prove that $f(z) = \cosh z$ is analytic and hence show that $f(z) = \sinh z$.
19. If the real part of an analytic function is $(r^2 \cos 2\theta - r \sin \theta)$ then find the corresponding imaginary part.

SECTION - D

Answer **any three** questions :

(3 × 5 = 15)

20. State and prove Cauchy's integral formula.
21. Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$ where 'C' is the circle $|z| = 1.5$.
22. Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along $y = x$ and $y = x^2$.
23. Find bilinear transformation which maps $z = \infty, i, 0$ into $w = -1, -i, 1$. Also find the fixed points of the transformation.



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MATHEMATICS – VIII

Paper 4.2 – Special Function and PDE – II

(New)

Time : 3 Hours

Max. Marks : 60

Instructions : Answer **all** Sections.

SECTION – A

Answer **any ten** questions :

(10 × 2 = 20)

1. Show that :

(a) $P_n(1) = 1$

(b) $P_n(-x) = (-1)^n P_n(x)$

2. Show that : $P_1(x) = x$ and $P_2(x) = \frac{1}{2}(3x^2 - 1)$ 3. Show that : $J_{-1/2}(x) = \sqrt{\frac{2}{\pi x}} \cos x$ 4. Show that : $\frac{d}{dx}[x J_1(x)] = x J_0(x)$ 5. Prove that : $H_2(x) = 4x^2 - 2$ 6. Prove that $H_{2n}(0) = (-1)^n \frac{(2n)!}{n!}$ 7. Show that : $L_n(0) = 1$

8. Define Laguerre polynomial of order 'n'.

9. Form the partial differential equation from $x^2 + y^2 = (z - c^2) \tan^2 \alpha$.10. Solve : $P^2 + q^2 = 1$ 11. Solve : $P^2 q^3 = 1$ 12. Solve : $Pe^y = qe^x$



SECTION - B

Answer **any five** questions :

(5 × 5 = 25)

13. State and prove orthogonal properties of the Legendre polynomials.

14. Show that : $J_{5/2}(x) = \sqrt{\frac{2}{\pi x}} \left[\frac{3-x^2}{x^2} \sin x - \frac{3}{x} \cos x \right]$

15. Show that : $H_n(x) = 2^n \left\{ \exp \left(\frac{-1}{4} \frac{d^2}{dx^2} \right) x^n \right\}$

16. Prove that $(n+1)L_{n+1}(x) = (2n+1-x)L_n(x) - nL_{n-1}(x)$

17. Solve : $z^2(p^2x^2 + q^2) = 1$

18. Solve : $(p^2 - q^2)z = x - y$

19. Solve : $z^2(p^2 + q^2 + 1) = 1$

SECTION - C

Answer **any three** questions :

(3 × 5 = 15)

20. Prove that : $nP_n(x) = xP'_n(x) - P'_{n-1}(x)$

21. Prove that : $\int_{-\infty}^{\infty} e^{-x^2} H_n(x) H_m(x) dx = \begin{cases} 0, & \text{if } m \neq n \\ \frac{\sqrt{\pi} 2^n}{n!}, & \text{if } m = n \end{cases}$

22. Evaluate : $\int x^3 J_3(x) dx$

23. Find the complete integral of $p^2x + q^2y = z$ by Charpits method.

24. Solve : $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$



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ZOOLOGY

Paper Z-4 – Animal Physiology and Bio-Chemistry

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) Answer all Sections.
- 2) Draw labelled diagrams wherever necessary.

SECTION – A

Answer **any five** of the following :

(5 × 2 = 10)

1. What is pace maker?
2. Distinguish between saturated and unsaturated fatty acids with examples.
3. What do you mean by synaptic transmission?
4. Expand ICSH and OT.
5. What is inter-nasal septum? Mention the functions of nose.
6. Define enzyme. Who coined the term enzyme?

SECTION – B

A. Answer **any four** of the following :

(4 × 5 = 20)

7. Write a short note on the functions of Estrogen and Progesterone hormones.
8. Draw a neat labelled diagram of the multipolar neuron.
9. Briefly explain the process of protein digestion in human beings.
10. Describe the steps involved in the process of urine formation.
11. Sketch and label the V.S. of human heart.
12. Give an account of the sliding filament theory of muscle contraction.

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(2 × 5 = 10)

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

13. Explain briefly about the Vitamin-A.
14. Enumerate the clinical significance of Enzymes.
15. Write a short note on the biological significance of carbohydrates.

SECTION - C

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

(2 × 10 = 20)

16. Describe the origin and conduction of human heart with the help of neat labelled diagram.
17. Explain in detail about the transport of CO₂ in the blood with the schematic representation.
18. Enumerate the hormones secreted by the Adenohypophysis of pituitary gland and their functions.

B. Answer **any one** of the following :

(1 × 10 = 10)

19. Explain in detail about the sources, functions and deficiency diseases of water soluble vitamins.
20. Describe the various steps involved in Glycolysis with the schematic representation.



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BOTANY

Paper IV – Ecology and Environmental Biology

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions :

- 1) *Answer all the questions.*
- 2) *Draw diagrams wherever necessary.*

I. Answer the following questions :

(15 × 1 = 15)

1. What is afforestation?
2. What is soil conservations?
3. Define food web.
4. What is Xerosere?
5. What is Ecosystem?
6. What are endemic species?
7. What is biogeochemical cycle?
8. What is nitrification?
9. What is ecological niche?
10. What are renewable resources?
11. What are producers?
12. What are chalophytes?
13. What are trophic level?
14. What are National Parks?
15. Name any two sanctuaries of India.



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(5 × 5 = 25)

II. Answer any five of the following :

16. Explain Pond ecosystem with neat labelled diagram.
17. What is quadrantes? Explain the types of the same.
18. What is soil erosion? Explain its controlling measures.
19. What is carbon cycle? Explain the carbon cycle with schematic representation.
20. Define food chain. Explain the types of food chain.
21. Explain the vegetation of Karnataka.
22. Write a note on importance of the forestry.

III. Answer any three of the following :

(3 × 10 = 30)

23. Define ecological pyramids. Explain the types.
24. What is ecological succession? Describe the various stages of hydrosere succession.
25. Explain the phytogeographical regions of India.
26. What are Xerophytes? Explain its anatomical and morphological adaptation of Xerophytes.
27. Write a short note on :
 - (a) Non-renewable resources
 - (b) Soil erosion



24421

IV Semester B.Sc. Degree Examination, September/October 2020

PHYSICS

Paper 04 – Physical Optics Fibre Optics and Special
Theory of Relativity

(New)

Time : 3 Hours

Max. Marks : 80

Instructions : Write answers to Section A in first two pages only.

SECTION – A

Answer the following :

(15 × 1 = 15)

1. What are coherent sources?
2. What is an air wedge?
3. Define fringe width.
4. What are half period zones?
5. What is grating element?
6. What lenses are used to study Fraunhofer diffraction?
7. Define Polarisation.
8. What is double refraction?
9. Define optical activity of a substance.
10. What is spherical aberration in lenses?
11. What is chromatic aberration in lenses?
12. Mention one use of Ramsden's eye piece.
13. What is accepting angle?
14. Write the relativistic mass formula.
15. Give the first postulate of special theory of Relativity.



SECTION – B

Answer **any five** of the following :

(5 × 5 = 25)

16. Discuss the theory of Young's Double slit experiment to obtain Expression for fringe width.
17. Explain Fraunhofer diffraction at a cylindrical wire.
18. Write a note on Half wave plate.
19. Derive an expression for equivalent focal length of two thin convex lenses separated by distance.
20. Derive an expression for numerical aperture.
21. Derive Lorentz transform equations.
22. Derive Mass-energy relation.

SECTION – C

Answer **any four** of the following :

(4 × 10 = 40)

23. (a) State Huygen's principle and the Laws of Reflection and Refraction.
(b) Mention the postulates of Quantum theory of light. (7 + 3)
24. (a) Explain Michelson Interferometer.
(b) Describe an experiment to determine the thickness of blade using Interference in air wedge. (5 + 5)
25. (a) Compare between a zone plate and a convex lens.
(b) Derive an expression for intensity in Fraunhofer diffraction at a single slit. (5 + 5)
26. (a) Explain Huygen's theory of double refraction.
(b) Explain Fresnel's theory of optical activity of quartz crystal. (5 + 5)
27. (a) Explain cardinal points of a coaxial optical system.
(b) Give the applications of optical fibres. (6 + 4)
28. (a) Derive an expression for variation of Mass with velocity.
(b) Calculate the K.E. of an electron moving with a velocity of 0.98 times the velocity of light in Laboratory system. (7 + 3)



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IV Semester B.Sc. Degree Examination, September/October 2020

PHYSICS

Paper 4 – Physical Optics, Fibre Optics and Special
Theory of Relativity

(CBCS)

Time : 3 Hours

Max. Marks : 70

Instructions : Write answers to Section A questions in the first two pages only.

SECTION – A

Answer the following :

(15 × 1 = 15)

1. What are the two methods of producing coherent sources?
2. Write one condition for producing sustained interference.
3. What is an air wedge?
4. Define fringe width.
5. What is double refraction?
6. Define polarization.
7. What is specific rotation?
8. Define optical activity of a substance.
9. Define numerical aperture of an optical fibre.
10. What is accepting angle?
11. What is the unit of Dispersion in optical fibres?
12. Give the first postulate of special theory of relativity.
13. What does μ meson decay explain?
14. Write the relativistic mass formula.
15. What is Minkowski's space?



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SECTION – B

(5 × 5 = 25)

Answer **any five** questions :

16. Discuss the theory of Young's double slit Experiment and obtain expression for fringe width.
17. Discuss the theory of zone plate.
18. Derive an expression for Intensity in Fraunhofer diffraction at a single slit.
19. Write a note on quarter wave plate.
20. Derive an expression for achromatic combination of lenses in contact.
21. Write the applications of optical fibres.
22. Explain the length contraction due to special theory of relativity.

SECTION – C

(3 × 10 = 30)

Answer **any three** of the following :

23. (a) Explain an Experiment to determine the wavelength of monochromatic source using Biprism.
(b) Discuss the theory of interferences in a thin film of uniform thickness. (5 + 5)
24. (a) Explain Fraunhofer diffraction at a single slit.
(b) Discuss the theory of plane transmission grating. (5 + 5)
25. (a) Write a note on Laurent's half shade polarimeter.
(b) Explain Huygen's theory of positive and negative crystals. (5 + 5)
26. (a) Derive an expression for equivalent focal length of two thin convex lenses separated by distance.
(b) Explain the cardinal points of coaxial optical system. (5 + 5)
27. (a) With a neat diagram explain Michealson-Morley experiment.
(b) Discuss its negative results. (7 + 3)