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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Research Methodology (Paper - 1) (1001/ PHD-101)

वार, दिनांक: मंगळवार, २८-०४-२०२६

कमाल गुण: ८०

वेळ: सकाळी ११:०० ते ०२:००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. २०**
- अ) संशोधनाच्या पारंपारिक पद्धती म्हणजे काय? ऐतिहासिक आणि तुलनात्मक संशोधन पद्धती स्पष्ट करा.
- ब) संशोधन अभिकल्पाची (Research Design) आवश्यकता सांगा. संशोधन अभिकल्पाचे वर्गीकरण स्पष्ट करा.
- प्र.२ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. २०**
- अ) नमुना निवड (Sampling) म्हणजे काय? नमुना निवडीच्या विविध पद्धती स्पष्ट करा.
- ब) संशोधनाचा अर्थ आणि महत्त्व सांगा. संशोधनाचे विविध प्रकार स्पष्ट करा.
- प्र.३ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. २०**
- अ) संशोधन अहवाल लेखनाच्या संदर्भात 'साहित्यिक चोरी' (Plagiarism) आणि 'संदर्भसूची' (Bibliography) या संकल्पना स्पष्ट करा.
- ब) परिमितीय आणि अपरिमितीय चाचण्या स्पष्ट करा.
- क) पथदर्शक अभ्यास म्हणजे काय? संशोधनातील पा पथदर्शक अभ्यासाची प्रक्रिया स्पष्ट करा.
- प्र.४ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. २०**
- अ) 'एथनोग्राफिक' (वांशिक-वर्णनात्मक) संशोधन पद्धती सविस्तर स्पष्ट करा.
- ब) संशोधनातील समस्या निश्चित करताना 'साहित्य आढाव्याचे' (Literature Review) महत्त्व स्पष्ट करा.
- क) 'परिकल्पना' (Hypothesis) म्हणजे काय? परिकल्पना परिक्षणाची प्रक्रिया स्पष्ट करा.

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**Ph.D. Course Work Examination: March/April – 2026
Research Methodology (Paper - 1) (1001/ PHD-101)**

Day & Date: Tuesday, 28-04-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer any one of the following questions. 20**
- a) What is mean by traditional methods of research? Explain the historical and competitive research method.
 - b) State need of research design. Explain the classification of research designs.
- Q.2 Answer any one of the following questions. 20**
- a) What is mean by sampling? Explain the different types of sampling methods.
 - b) State meaning and importance of research. Explain various types of research.
- Q.3 Answer any two of the following question. 20**
- a) Explain the concept of plagiarism and bibliography with reference with research report writing.
 - b) Explain the parametric and non-parameter test.
 - c) What is meant by pilot study? Explain the process of pilot study in research.
- Q.4 Answer any two of the following question. 20**
- a) Explain ethnographic methods in detail.
 - b) Explain the importance of literature review in defining a problem.
 - c) What is meant by hypothesis? Explain the process of hypothesis testing.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Information and Computer Technology (Paper - 2 (A))
(1002(A) / PHD-102 (A))

वार, दिनांक: गुरुवार, ३०-०४-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: ४०

सूचना : १) सर्व प्रश्न आवश्यक आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील प्रश्नाचे उत्तर लिहा. (कोणताही एक) २०**
- अ) संशोधन माहिती संकलनासाठी Google Forms व Survey Monkey सारख्या ऑनलाइन सर्वेक्षण साधनांचे महत्त्व स्पष्ट करा. Google Sheets व Google Docs सारख्या सहयोगी माहिती संकलन व लेखन साधनांचे स्पष्टीकरण द्या.
- ब) राष्ट्रीय व आंतरराष्ट्रीय पेटंट संस्था स्पष्ट करा. ई-सबमिशन प्रक्रियेसह पेटंट अर्ज दाखल करण्याची संपूर्ण प्रक्रिया स्पष्ट करा.
- प्र.२ खालील प्रश्नांची उत्तरे लिहा. (कोणतेही दोन)**
- अ) संशोधन अहवाल तयार करण्यामध्ये Word Processing सॉफ्टवेअरची वैशिष्ट्ये व उपयोग स्पष्ट करा. दस्तऐवज तयार करणे व जतन करण्याची प्रक्रिया स्पष्ट करा. १०
- ब) Presentation Software व Spreadsheet यांची थोडक्यात ओळख करून द्या. संशोधन अहवाल सादरीकरण व माहिती व्यवस्थापनामधील त्यांचे उपयोग स्पष्ट करा. १०
- क) आयसीटी साधनांचे उपयोग स्पष्ट करा. शैक्षणिक, सामाजिक आणि आर्थिक विकासावर आयसीटीचा होणारा परिणाम स्पष्ट करा. १०

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**Ph.D. Course Work Examination: March/April – 2026
Information and Computer Technology (Paper - 2 (A))
(1002(A) / PHD-102 (A))**

Day & Date: Thursday, 30-04-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 40

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Answer Any One of the following. 20

- a) Explain the importance of online survey tools such as Google Forms and Survey Monkey in research data collection. Discuss collaborative data collection and academic writing tools like Google Sheets and Google Docs.
- b) Describe national and international patent agencies. Explain the complete procedure of patent filing including e-submission process.

Q.2 Answer Any Two of the following.

- a) Explain the features and uses of word processing software in research report preparation. Describe the process of creating and saving a document. **10**
- b) Give a brief introduction to presentation software and spreadsheets. Explain their applications in research report presentation and data organization. **10**
- c) Explain the uses of ICT tools. Explain the impact of ICT on Educational, Social & Economic Development. **10**

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
Research and Publication Ethics (Paper – 2 (B))
(1002(B) / PHD-102 (B))

वार, दिनांक: गुरुवार, ३०-०४-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: ४०

सूचना : १) सर्व प्रश्न आवश्यक आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

प्र.१ खालील प्रश्नाचे उत्तर लिहा. (कोणताही एक)

- अ) संशोधनात नैतिकतेचे पालन करण्यामागील तत्त्वज्ञान स्पष्ट करा. नैतिक निर्णय, वस्तुनिष्ठता आणि पारदर्शकता यांचे महत्त्व स्पष्ट करा. तत्त्वज्ञानाच्या विविध शाखा संशोधनातील नैतिक निर्णय घेण्यास कशा मार्गदर्शन करतात ते स्पष्ट करा. २०
- ब) संशोधनातील नैतिकतेची सात तत्त्वे विशद करा. वैज्ञानिक गैरवर्तनाची उदाहरणे द्या आणि त्याचा संशोधनाच्या विश्वासाहतेवर होणारा परिणाम स्पष्ट करा. २०
- क) जबाबदार प्रकाशन पद्धती, लेखकत्व व योगदान, गोपनीयता आणि हितसंबंधांचा संघर्ष (Conflict of Interest) स्पष्ट करा. संशोधन भक्षक (Predatory) जर्नलपासून स्वतःचे संरक्षण कसे करावे आणि बौद्धिक संपत्तीचा आदर कसा राखावा ते स्पष्ट करा. २०

प्र.२ खालील प्रश्नांची उत्तरे लिहा. (कोणतेही दोन)

- अ) नैतिकतेची व्याख्या करा आणि संशोधन पद्धतींना मार्गदर्शन करण्यामध्ये नैतिक विचारांची भूमिका स्पष्ट करा. १०
- ब) साहित्यचौर्य (Plagiarism) आणि निवडक अहवाल (Selective Reporting) यावर थोडक्यात टिपणे लिहा. हे संशोधन नैतिकतेचे उल्लंघन का मानले जाते? १०
- क) संशोधन प्रकाशनात "हितसंबंधांचा संघर्ष" (Conflict of Interest) म्हणजे काय? पारदर्शकता राखण्यासाठी त्याचे महत्त्व स्पष्ट करा. १०

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**Ph.D. Course Work Examination: March/April – 2026
Research and Publication Ethics (Paper - 2 (B))
(1002(B) / PHD-102 (B))**

Day & Date: Thursday, 30-04-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 40

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Answer Any One of the following.

- a) Discuss the philosophy of observing ethics in research, highlighting the nature of moral judgments, objectivity, and openness. How do branches of philosophy guide ethical decision-making in academic research? **20**
- b) Evaluate the seven principles of ethics in research. Provide examples of scientific misconduct and explain their impact on the credibility of research. **20**
- c) Explain responsible publication practices, authorship and contributorship, confidentiality, and conflict of interest. How can researchers safeguard themselves against predatory publishers and ensure respect for intellectual property? **20**

Q.2 Answer Any Two of the following.

- a) Define ethics and explain the role of moral considerations in guiding research practices. **10**
- b) Write short notes on plagiarism and selective reporting. Why are these considered violations of research ethics? **10**
- c) What is meant by “conflict of interest” in research publications? Briefly explain its significance in maintaining transparency. **10**

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Ph.D. Course Work Examination: March/April – 2026
English (Paper - 3)
Advanced Knowledge in Core Domain of English
(A Study of English Literary and Critical Theories) (1005/ PHD-103)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) What is the significance of feminism in contemporary research? Discuss with reference to research in literature.
 - b) Bring out the contribution of Roland Barthes in poststructuralism.
- Q.2 Answer Any One of the following. 20**
- a) How far postcolonial theories are applicable to the study of Indian literature in English? Substantiate with examples.
 - b) "Race and ethnicity open up a significant critical perspective in the study of fiction." Discuss.
- Q.3 Answer Any One of the following. 20**
- a) Bring out the salient features of Gay theories.
 - b) How would you locate Lesbian feminist theory on the map of feminism? Explain the theoretical aspects.
- Q.4 Answer Any Two of the following. 20**
- a) Illustrate the various developmental stages of translation studies.
 - b) Discuss the linguistic aspects of translation with examples.
 - c) Describe the theories in comparative literature.
- Q.5 Answer Any Two of the following. 20**
- a) Write a note on Cooperative principle and its maxims.
 - b) What is stylistic analysis? Attempt a stylistic analysis of poetry with reference to the poems of your choice.
 - c) Elaborate on the concept of Discourse studies.

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
Marathi (Paper - 3)
Advanced Knowledge in Core Domain of Marathi
(मराठी साहित्याचे स्वरूप आणि उपयोजन) (1006/ PHD-104)

वार, दिनांक: शनिवार, ०२-०५-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: १००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ दिर्घोत्तरी प्रश्न: खालीलपैकी कोणत्याही एका प्रश्नाचे दीर्घ उत्तर लिहा. २०**
- अ) 'संत साहित्य हे सांस्कृतिक ऐक्य साधणारे व नैतिक मूल्य रुजवणारे आहे'. हे विधान स्पष्ट करा.
- ब) मराठी साहित्याच्या भाषिक व सामाजिक बदलासाठीचे मध्ययुगीन कालखंडाचे योगदान नोंदवा.
- प्र.२ दिर्घोत्तरी प्रश्न: खालीलपैकी कोणत्याही एका प्रश्नाचे दीर्घ उत्तर लिहा. २०**
- अ) 'मार्क्सवादी समीक्षा पद्धतीत' वर्गसंघर्षाच्या चित्रणाचा अभ्यास कशा रीतीने होतो ते स्पष्ट करा.
- ब) 'दलित साहित्य शोकांतिका नाही, तर स्वाभिमानाचा शोध घेते' या विधानाचा परामर्श घ्या.
- प्र.३ दिर्घोत्तरी प्रश्न: खालीलपैकी कोणत्याही एका प्रश्नाचे दीर्घ उत्तर लिहा. २०**
- अ) भाषेच्या अचूक लेखनासाठी आणि अर्थपूर्ण संभाषणासाठी व्याकरणाची आवश्यकता स्पष्ट करा.
- ब) स्त्रियांच्या स्वत्वाचा शोध स्त्रीवादी साहित्यात कशा रीतीने व्यक्त होतो ते स्पष्ट करा.
- प्र.४ लघुत्तरी प्रश्न: खालीलपैकी कोणत्याही दोन प्रश्नांची थोडक्यात उत्तरे लिहा. २०**
- अ) संस्कृतीचा व्यापक अर्थ सांगून, साहित्यातील संस्कृतीचे महत्त्व अधोरेखित करा.
- ब) साहित्याच्या समीक्षा व्यवहाराचे स्वरूप स्पष्ट करा.
- क) वाचकाला साहित्यकृतीतून प्राप्त होणाऱ्या उपयोजनमूल्याचे स्वरूप स्पष्ट करा.

- प्र.५ लघुत्तरी प्रश्न: खालीलपैकी कोणत्याही दोन प्रश्नांची थोडक्यात उत्तरे लिहा. २०
- अ) समाज आणि संस्कृती यांचा सहसंबंध स्पष्ट करा.
- ब) साहित्यकृतीच्या स्वरूपात धर्म आणि संस्कृतीच्या प्रभावामुळे होणाऱ्या बदलाचा आढावा घ्या.
- क) आंतरजालावरील साहित्य व्यवहाराची उपयुक्तता स्पष्ट करा.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Hindi (Paper - 3)
Advanced Knowledge in Core Domain of Hindi (हिंदी साहित्य)
(1007/ PHD-105)

वार, तारीख: शनिवार, ०२-०५-२०२६
 समय: सुबह ११:०० से ०२:००

कमाल गुण: १००

सूचनाएँ : १) सभी प्रश्न अनिवार्य हैं।

२) दाईं ओर लिखे अंक प्रश्न के लिए निर्धारित अंक हैं।

- प्र.१ निम्नलिखित प्रश्न का उत्तर लिखिए। (दीर्घ उत्तर) (कोई भी एक) २०**
 'रश्मिर्थी' काव्य की महाकाव्यात्मकता को स्पष्ट कीजिए।
अथवा
 'यमदीप' उपन्यास के कथ्य का विवेचन कीजिए।
- प्र.२ निम्नलिखित प्रश्न का उत्तर लिखिए। (दीर्घ उत्तर) (कोई भी एक) २०**
 हिंदी आत्मकथा की विकास परंपरा को स्पष्ट कीजिए।
अथवा
 हिंदी एकांकी साहित्य की उपयोगिता बताकर विकास यात्रा पर प्रकाश डालिए।
- प्र.३ सुशीला टाकभौरे की कहानियों में चित्रित दलित चेतना को स्पष्ट कीजिए। २०**
अथवा
 धूमिल की कविताओं में अभिव्यक्त व्यंग्य का विवेचन कीजिए।
- प्र.४ संक्षेप में उत्तर लिखिए। (कोई भी दो)**
 अ) 'आधे अधुरे' नाटक में चित्रित मूल्य संघर्ष को स्पष्ट कीजिए। १०
 ब) संस्मरण और रेखाचित्र के अंतर को स्पष्ट कर संस्मरण की विकास यात्रा लिखिए। १०
 क) हिंदी डायरी लेखन की परंपरा बताकर उसकी उपयोगिता को स्पष्ट कीजिए। १०
- प्र.५ संक्षेप में उत्तर लिखिए। (कोई भी दो)**
 अ) इक्कीसवीं सदी की हिंदी कहानी का परिचय दीजिए। १०
 ब) हिंदी आलोचना के प्रमुख पडावों का विवेचन कीजिए। १०
 क) अनुवाद का स्वरूप एवं विशेषताएँ लिखिए। १०

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Ph.D. Course Work Examination: March/April – 2026
KANNADA (Paper – 3)
Advanced Knowledge in Core Domain of Kannada (1008/PHD-106)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- ಪ್ರ.೧ ಬೇಕಾದ ಒಂದಕ್ಕೆ ಉತ್ತರಿಸಿರಿ. ೨೦
 ೧) ಹಳಗನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಮುಖ ಲಕ್ಷಣಗಳನ್ನು ಪರಿಚಯಿಸಿರಿ.
 ೨) ಪ್ರಮುಖ ವಚನಕಾರರನ್ನು ಕುರಿತು ವಿವೇಚಿಸಿರಿ.
- ಪ್ರ.೨ ಬೇಕಾದ ಒಂದಕ್ಕೆ ಉತ್ತರಿಸಿರಿ. ೨೦
 ೧) ರಸ ಎಂದರೇನು? ಅದರ ಪ್ರಭೇದಗಳಾವವು? ವಿವರಿಸಿರಿ.
 ೨) ಅಂಶಗಣ ಛಂದಸ್ಸಿನ ಮಟ್ಟಗಳಾವವು? ವಿಶ್ಲೇಷಿಸಿರಿ.
- ಪ್ರ.೩ ಬೇಕಾದ ಒಂದಕ್ಕೆ ಉತ್ತರಿಸಿರಿ. ೨೦
 ೧) ಕರ್ನಾಟಕ ಜನಪದ ರಂಗಭೂಮಿಯ ಪ್ರಭೇದಗಳನ್ನು ವಿವರಿಸಿರಿ.
 ೨) ಭಾಷೆಯ ಸ್ವರೂಪ-ಲಕ್ಷಣಗಳನ್ನು ಕುರಿತು ಚರ್ಚಿಸಿರಿ.
- ಪ್ರ.೪ ಬೇಕಾದ ಎರಡಕ್ಕೆ ಉತ್ತರಿಸಿರಿ. ೨೦
 ೧) ನವೋದಯ ಸಾಹಿತ್ಯದ ಧೋರಣೆಗಳನ್ನು ತಿಳಿಸಿರಿ.
 ೨) ಜನಪದ ಸಾಹಿತ್ಯದ ವರ್ಗೀಕರಣ ಬರೆಯಿರಿ.
 ೩) ಕರ್ನಾಟಕದ ಧಾರ್ಮಿಕ ಪರಂಪರೆಗಳನ್ನು ಕುರಿತು ವಿವರಿಸಿರಿ.
- ಪ್ರ.೫ ಬೇಕಾದ ಎರಡಕ್ಕೆ ಉತ್ತರಿಸಿರಿ. ೨೦
 ೧) ವಡ್ಡಾರಾಧನೆ ಕಥೆಗಳು ಮೂಲತಃ ಜನಪದ ಕಥೆಗಳೇ ಅಗಿವೆ ಎಂಬುದನ್ನು ಚರ್ಚಿಸಿರಿ.
 ೨) ತ್ರಿಪದಿಯ ಲಕ್ಷಣ ಮತ್ತು ಇತಿಹಾಸವನ್ನು ಬರೆಯಿರಿ.
 ೩) ಕೊಡಗಿನ ಗೌರಮ್ಮ ವೈದೇಹಿ ಆವರುಗಳನ್ನು ಪರಿಚಯಿಸಿರಿ.

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Set P

Ph. D Course Work Examination: March/April - 2026
Urdu (Paper -3)
Advanced Knowledge in Core Domain of Urdu (1011/ PHD-107)

Day & Date: Saturday, 02-05-2026

Max. Marks: 100

Time: 11:00 AM To 02:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the left indicate full marks.

- 20 سوال نمبر 1. مندرجہ ذیل سوال کا مفصل جواب لکھیے۔ (کوئی ایک)
- (A) ترقی پسند اردو افسانہ نگاری کا آغاز و ارتقاء کا مفصل جائزہ لیجیے؟
 (B) اردو افسانہ نگاری پر ترقی پسند تحریک کے اثرات کا تفصیلی جائزہ لیجیے؟
- 20 سوال نمبر 2. مندرجہ ذیل سوال کا مفصل جواب لکھیے۔ (کوئی ایک)
- (A) ترقی پسند تحریک کیا ہے؟ اس تحریک کے اغراض و مقاصد کا مفصل جائزہ لیجیے؟
 (B) ترقی پسند اردو تنقید نگاری کا آغاز و ارتقاء پر مفصل روشنی ڈالیے؟
- 20 سوال نمبر 3. مندرجہ ذیل سوال کا مفصل جواب لکھیے۔ (کوئی ایک)
- (A) ترقی پسند اردو شاعری کا آغاز و ارتقاء پر مفصل نوٹ لکھیے؟
 (B) ترقی پسند اردو شاعری کی نمایاں خصوصیات مفصل بیان کیجیے؟
- 20 سوال نمبر 4. مندرجہ ذیل سوالات کے مختصر جوابات لکھیے۔ (کوئی دو)
- (A) ترقی پسند اردو ناول نگاری کی نمایاں خصوصیات پر مختصر نوٹ قلمبند کیجیے؟
 (B) کلیم الدین احمد کی تنقیدی خدمات پر تبصرہ کیجیے؟
 (C) عصمت چغتائی کی ناول نگاری پر اظہار خیال کیجیے؟
- 20 سوال نمبر 5. مندرجہ ذیل سوالات کے مختصر جوابات لکھیے۔ (کوئی دو)
- (A) حیات اللہ انصاری کی افسانہ نگاری کی خصوصیات بیان کیجیے؟
 (B) سعادت حسین منٹو کے چند اہم افسانوں پر مختصر تبصرہ کیجیے؟
 (C) قرۃ العین حیدر کے چند ناولوں کا مختصر تنقیدی جائزہ لیجیے؟

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Psychology (Paper – 3)
Advanced Knowledge in Core Domain of Psychology
(1012/PHD-108)

वार, दिनांक: शनिवार, ०२-०५-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: १००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घ उत्तर प्रश्न) २०
अ) मानवतावादी मानसोपचार स्पष्ट करा.
ब) चिंता विकाराची कारणे आणि त्यावरील उपचार स्पष्ट करा.
- प्र.२ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घ उत्तर प्रश्न) २०
अ) खाण्याच्या विकारांचे प्रमुख प्रकार स्पष्ट करा.
ब) चिकित्सा मानसशास्त्राचा संक्षिप्त इतिहास सांगा.
- प्र.३ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घ उत्तर प्रश्न) २०
अ) समुपदेशनाची व्याख्या सांगा. समुपदेशक कौशल्यांची तपशीलवार चर्चा करा.
ब) गट समुपदेशनाच्या प्रकारांवर चर्चा करा.
- प्र.४ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न)
अ) अभीवृत्ती म्हणजे काय? अभीवृत्ती आपल्या वर्तनाचा कसे अंदाज लावतात ते सांगा. १०
ब) तणावामुळे आजार होतात. या विधानाचे समर्थन करणारे गंभीर पुरावे सांगा. १०
क) व्यक्तित्वातील हृदय व रक्तवाहिन्यासंबंधी रोग समजावून सांगा. १०
- प्र.५ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न)
अ) समुपदेशकाची भूमिका आणि तंत्र सांगा. १०
ब) समुपदेशकांसाठी नैतिकच्या विकासावर चर्चा करा. १०
क) समुपदेशन प्रक्रियेवर परिणाम करणाऱ्या घटकांवर चर्चा करा. १०

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Ph.D. Course Work Examination: March/April – 2026
Psychology (Paper – 3)
Advanced Knowledge in Core Domain of Psychology
(1012/ PHD-108)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain the Psychotherapy of Humanistic.
 - b) Explain the Causes and treatment of anxiety disorder.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain the Major Types of eating Disorders.
 - b) State the brief history of clinical psychology.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) State the definition of counseling. Discuss the detail counselor skills.
 - b) Discuss the types of group counseling.
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- a) What is Attitude? State attitudes Predict our behaviour. **10**
 - b) Stress Causes illness. Critically the evidence to support this statement. **10**
 - c) Explain the cardiovascular diseases of personality. **10**
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- a) State the role and techniques of counselor. **10**
 - b) Discuss the development of codes of ethics for counselors. **10**
 - c) Discuss the Variables affecting the counseling process. **10**

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
History (Paper - 3)
Advanced Knowledge in Core Domain of History
(Basic & Advanced Knowledge in History) (1014/ PHD-109)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
 २) उजवीकडील अंक पूर्ण गुण दर्शवितात.

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| प्र.१ | खालील कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) | २० |
| | अ) बौद्ध धर्मातील तत्वज्ञानाची माहिती द्या. | |
| | ब) सिंधू संस्कृतीच्या नगररचनेची वैशिष्ट्ये सांगा. | |
| प्र.२ | खालील कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) | २० |
| | अ) भारतातील इ.स. १८५७ च्या उठावाची कारणे व परिणाम सांगा. | |
| | ब) भारतीय असहकार चळवळीवर चर्चा करा. | |
| प्र.३ | खालील कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) | २० |
| | अ) सम्राट चंद्रगुप्त मौर्याच्या कामगिरीचे मूल्यमापन करा. | |
| | ब) मुघलकालीन सामाजिक व सांस्कृतिक परिस्थितीचे वर्णन करा. | |
| प्र.४ | खालील कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न) | २० |
| | अ) इतिहासाच्या व्याख्या सांगून त्याचे स्वरूप स्पष्ट करा. | |
| | ब) औद्योगिक क्रांतीचे परिणाम सविस्तर सांगा. | |
| | क) मराठी सत्तेच्या उदयाची कारणे सांगा. | |
| प्र.५ | खालील कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न) | २० |
| | अ) स्वातंत्र्योत्तर कालखंडातील भारताच्या आंतरराष्ट्रीय संबंधाचा आढावा घ्या. | |
| | ब) भारतीय राज्यघटनेची वैशिष्ट्ये सांगा. | |
| | क) भारतीय संस्थानाच्या विलीनीकरणाचा आढावा घ्या. | |

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Ph.D. Course Work Examination: March/April – 2026
History (Paper - 3)
Advanced Knowledge in Core Domain of History
(Basic & Advanced Knowledge in History) (1014/ PHD-109)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the Philosophy of Buddhism.
b) Discuss on the features of Indus Civilization urban planning.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the causes and effects for Revolt of 1857.
b) Discuss the Non- co-operation Movement in India.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
a) Evaluate the achievements of emperor Chandragupt Mourya.
b) Describe the Social and Cultural conditions during the Mughal Period.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
a) Explain the definitions and Nature of history.
b) Explain the effects of Industrial Revolution.
c) State the reasons for the rise of Maratha power.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
a) Review the International relation in India after independence.
b) Explain the silent features of Indian Constitution.
c) Review the Integration of Princely States in India.

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
Political Science (Paper - 3)
Advanced Knowledge in Core Domain of Political Science
(1016/ PHD-111)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
 २) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
 अ) नव-लोकप्रशासन म्हणजे काय? त्याचे स्वरूप व व्याप्ती स्पष्ट करा.
 ब) शीतयुद्धानंतर आंतरराष्ट्रीय राजकारणाच्या बदलत्या स्वरूपाची चर्चा करा.
- प्र.२ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
 अ) तुलनात्मक राजकारणाचे स्वरूप आणि व्याप्ती स्पष्ट करा.
 ब) भारतातील सत्ता संरचनेतील जातीची भूमिका विशद करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
 अ) डॉ. बाबासाहेब आंबेडकर यांच्या सामाजिक न्यायाच्या संकल्पनेची सविस्तर चर्चा करा.
 ब) स्त्रीवादी चळवळ सविस्तर स्पष्ट करा.
- प्र.४ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
 अ) समतेचा अर्थ, व्याख्या व प्रकार लिहा.
 ब) भारतीय संविधान सभेत झालेल्या मूलभूत हक्क आणि मार्गदर्शक तत्वांवरील वादविवादांची चर्चा करा.
 क) नागरी समाज आणि राज्य ही संकल्पना स्पष्ट करा.
- प्र.५ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
 अ) स्वातंत्र्याचा अर्थ, व्याख्या व प्रकार लिहा.
 ब) राम मोहन लोहिया यांची सामाजिक न्यायाची संकल्पना स्पष्ट करा.
 क) सामाजिक शास्त्रातील नवीन संस्थात्मक दृष्टीकोनाची चर्चा करा.

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Ph.D. Course Work Examination: March/April - 2026
Political Science (Paper - 3)
Advanced Knowledge in Core Domain of Political Science
(1016/ PHD-111)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
a) What is New Public Administration? Explain its nature and scope.
b) Discuss the changing nature of international politics in the post cold war.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the nature and scope of comparative politics.
b) Explain the role of caste in the power structure of India.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
a) Discuss in the detailed concept of social justice of Dr. Babasaheb Ambedkar.
b) Explain in detail the feminist movement.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
a) Write the meaning, definition and types of equality.
b) Discuss the debates on fundamental rights and directive principles in the Indian constitution assembly.
c) Explain the concept of civil society and state.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
a) Write the meaning, definition and types of liberty.
b) Explain Ram Mohan Lohia's concept of social justice.
c) Discuss new institutionalism approach in social science.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Economics (Paper - 3)

Advanced Knowledge in Core Domain of Economics (1018/ PHD-112)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

- सूचना :** १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
अ) कर महसुलाची व्याख्या देऊन कर महसुलाच्या वाटपातील अडथळे स्पष्ट करा.
ब) भारताच्या आर्थिक विकासातील कृषी क्षेत्राची भूमिका स्पष्ट करा.
- प्र.२ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
अ) भारतातील कर सुधारणेबाबत सविस्तर चर्चा करा.
ब) नाबार्डची (NABARD) स्थापना आणि तिची संस्थात्मक वित्तपुरवठ्यातील भूमिका स्पष्ट करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
अ) कृषी क्षेत्रातील भांडवल निर्मितीत येणाऱ्या अडथळ्यांची सविस्तर मांडणी करा.
ब) कृषी विकासासाठीचे फेई-रॅनिस (Fei-Ranis) यांचे प्रतिमान स्पष्ट करा.
- प्र.४ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
अ) भारतातील श्रम बाजाराची वैशिष्ट्ये स्पष्ट करा.
ब) कृषी क्षेत्रातील नवीन तंत्रज्ञानाच्या वापरामुळे उत्पादन फलनात झालेले बदल लिहा.
क) भारतातील 'अन्न सुरक्षा' यावर टिपण लिहा.
- प्र.५ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
अ) सन १९९१ नंतर भारताच्या वित्तीय क्षेत्रातील सुधारणा विशद करा.
ब) घटक संयोजन (Input Combination) म्हणजे काय? घटक संयोजनाबाबत विस्ताराने लिहा.
क) भारतातील कृषी-उद्योगांची भूमिका आणि त्यांच्या समस्या थोडक्यात लिहा.

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Ph.D. Course Work Examination: March/April – 2026
Economics (Paper - 3)
Advanced Knowledge in Core Domain of Economics
(1018/ PHD-112)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Define tax revenue and explain the problems in the sharing of tax revenue.
 b) Explain the Role of Agriculture in the economic development of India.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Discuss in detail the tax reforms in Indian economy.
 b) Explain the establishment and role of NABARD in institutional credit.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain in detail about the problems of capital formation in Indian agriculture.
 b) Explain the Fei-Ranis Model for agricultural development.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
 a) Explain the characteristics of labour market in India.
 b) Write the use of new technology and shift in production function in agricultural sector.
 c) Write a note on 'Food Security in India'.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
 a) Explain the financial sector reforms since 1991 in India.
 b) What is input combination? Write in detail about it.
 c) Write in short about the Role and Problems of Agro-Industries in India.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Rural Development (Paper - 3)
Advanced Knowledge in Core Domain of Rural Development
(Recent Trends in Rural Development) (1019/ PHD-113)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

- सूचना :** १) सर्व प्रश्न अनिवार्य आहेत.
 २) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०**
 अ) ग्रामीण पायाभूत सुविधा म्हणजे काय? ग्रामीण पायाभूत सुविधेचे महत्व आणि गरज स्पष्ट करा.
 ब) ग्रामीण कामगार ही संकल्पना स्पष्ट करून भारतातील ग्रामीण कामगारांची महत्वाची वैशिष्ट्ये विशद करा.
- प्र.२ खालील कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) २०**
 अ) पंचवार्षिक योजना कालावधीत भारताच्या ग्रामीण भागात झालेला विकास विस्ताराने स्पष्ट करा.
 ब) ग्रामीण उपजीविका म्हणजे काय? जागतिकीकरणाचा भारतातील ग्रामीण उपजीविकेवर झालेला परिणाम विशद करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) २०**
 अ) भारताच्या ग्रामीण भागातील पायाभूत सुविधेतील समस्यांबाबत चर्चा करा.
 ब) ग्रामीण बिगर-कृषी क्षेत्र म्हणजे काय? भारतातील ग्रामीण बिगर-कृषी क्षेत्रापुढील आव्हाने लिहा.
- प्र.४ खालील कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न) २०**
 अ) ग्रामीण विकासाबाबतचा दृष्टीकोन आणि व्यूहरचना स्पष्ट करा.
 ब) शाश्वत ग्रामीण उपजीविका ही संकल्पना विस्ताराने विशद करा.
 क) विशेषतः ग्रामीण भागातील दारिद्र्य निर्मूलनाच्या कार्यक्रमाबाबत टिपण लिहा.
- प्र.५ खालील कोणत्याही दोन प्रश्नांची उत्तरे लिहा. (लघुत्तरी प्रश्न) २०**
 अ) ग्रामीण पर्यटन म्हणजे काय? ग्रामीण विकासात ग्रामीण पर्यटनाची भूमिका स्पष्ट करा.
 ब) ग्रामीण विकासाची 'दिन दयाळ उपाद्याय ग्रामीण कौशल्य योजना' लिहा.
 क) ग्रामीण उपजीविकेला चालना देण्यासाठी सरकारची धोरण स्पष्ट करा.

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Ph.D. Course Work Examination: March/April – 2026
Rural Development (Paper - 3)
Advanced Knowledge in Core Domain of Rural Development
(Recent Trends in Rural Development) (1019/ PHD-113)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) What is Rural Infrastructure? Explain the importance and need of rural infrastructure.
- b) Explain the concept of rural labour and write the key features of rural labours in India.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain in detail about the rural development under five year plans in India.
- b) What is rural livelihood? Explain the impact of globalization on India's rural livelihood.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Discuss about the problems of rural infrastructure in India.
- b) What is rural non-farm sector? Write the challenges of rural non-farm sector in India.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Explain the approaches and strategies of rural development.
- b) Explain in detail about the concept of sustainable rural livelihood.
- c) Write a note on poverty alleviation programmes particularly in rural area.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) What is rural tourism? Explain the role of rural tourism in rural development.
- b) Write about the scheme of 'Deen Dayal Upadhyaya Grameen Kaushalya Yojana' for rural development.
- c) Explain the Government policies to promote rural livelihoods.

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Ph.D. Course Work Examination: March/April – 2026
Law (Paper – 3)
Advanced Knowledge in Core Domain of Law (1020/ PHD-114)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) Explain in detail the concept of sociological jurisprudence by giving emphasis on theory of social engineering.
 - b) Growing cases of suicide is an offence against morality.
- Q.2 Answer Any One of the following. 20**
- a) The judgement given by supreme court in Keshavanand Bharti's case has changed the dimensions of Indian Constitution.- Justify.
 - b) Right to information is indispensable fundamental right linked to right to liberty. – Comment.
- Q.3 Answer Any One of the following. 20**
- a) The advent of information technology has made tremendous changes in justice delivery system. – comment.
 - b) Write a brief note on precedent as a source of law, with the help of various interpretations made by judiciary in regard to constitution.
- Q.4 Answer Any Two of the following.**
- a) Law and Morality 10
 - b) John Rawl's theory 10
 - c) Theory of Ihering 10
- Q.5 Answer Any Two of the following.**
- a) Law changes the society, Justify. 10
 - b) E- Governance 10
 - c) Implementation of directive principles through fundamental duties. 10

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Ph.D. Course Work Examination: March/April – 2026
Chemistry (Paper - 3)
Advanced Knowledge in Core Domain of Chemistry
(Recent Trends in Chemistry) (1021/ PHD-119)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) How can COSY, NOESY, NOE, DEPT, and 2D-NMR methods be used to determine the structural features and interactions of organic molecules and what are the differences and similarities between them?
 - b) How can oxone, hypervalent iodine reagents, complex metal hydrides, organometallic compounds of Cu, Ni, Co, and Mn be used as versatile reagents for various organic transformations and what are the reaction mechanisms and scope and limitations of these reagents?
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) How can Mossbauer spectroscopy detect the presence of inequivalent Mossbauer atoms and what are the numerical methods to calculate their relative populations and isomer shifts?
 - b) What are the biological investigations of organic and inorganic compounds? How can these biological investigations be used to evaluate the potential and efficacy of organic and inorganic compounds as therapeutic agents and drug candidates?
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) What are the general steps and criteria for method development and validation of analytical methods and why are they important for ensuring the quality and reliability of analytical results?
 - b) What are the principles and applications of electron spin resonance spectroscopy and how can it be used to study the structure and dynamics of free radicals and other paramagnetic species?

Q.4 Answer Any Two of the following. (Short Answer Question) 20

- a) What are the differences and similarities between SEM, TEM, and AFM in terms of their principles, instrumentation, and applications for nano materials imaging?
- b) What are the factors that affect the nature of M-L bond and the structure of Sn^{+2} and Sn^{+4} compounds and how can Mossbauer spectroscopy provide information about them?
- c) What are biocatalysts and biotransformation's and how can they be used to perform selective and efficient synthesis of organic compounds that are difficult or impossible to obtain by chemical methods?

Q.5 Answer Any Two of the following. (Short Answer Question) 20

- a) What are the strategies and methods to achieve enantio- and diastereoselective synthesis of organic compounds and what are the factors that influence the stereochemical outcome of these reactions?
- b) How can electrical properties (Conductivity, Cyclic Voltammetry) be used to study the electronic and electrochemical behavior of nano materials?
- c) What are the definitions and formulas of accuracy, precision, linearity, range, limit of detection (LOD), limit of quantification (LOQ), system suitability, and stability and what are the factors that affect these parameters in analytical methods?

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Ph.D. Course Work Examination: March/April – 2026
Physics (Paper - 3)
Advanced Knowledge in Core Domain of Physics
(Characterization Techniques) (1022/PHD-120)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- Explain the principle and instrumentation of FTIR spectroscopy and its role in identifying functional groups and molecular structures.
 - What is low-angle XRD? How is it used for texture analysis and material characterization?
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- Explain basic principle and instrumental configuration of XPS.
 - State and explain Bragg's law. Explain different types of X-ray diffraction setups ($\theta - \theta$ and $\theta - 2\theta$).
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- Describe how AFM works, including its contact, and non-contact modes. What are its applications in nano scale measurements, surface force, and molecular recognition?
 - Explain basic principle and instrumental configuration of FESEM.
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- Explain different type of sources and detectors used in X-ray diffraction technique. **10**
 - What is IR spectroscopy? How docs FTIR work, and what modes of vibration are detected? **10**
 - What are the basic concepts of UV-VIS spectroscopy? Explain the Tauc's method for optical band gap determination? **10**
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- Write a detailed note on backscattered and secondary electrons in SEM. **10**
 - What are the differences between SEM and TEM? Explain how images are formed and why FESEM is better than SEM. **10**
 - What is electron diffraction in TEM? Explain Selected Area Electron Diffraction (SAED) and its importance. **10**

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Ph.D. Course Work Examination: March/April – 2026
Statistics (Paper - 3)
Advanced Knowledge in Core Domain of Statistics
(Advanced Statistics) (1024/ PHD-122)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) Discuss the design and implementation of (\bar{X}) and (S) control charts. Derive the control limits and explain the role of warning limits and sensitizing rules. Illustrate how these modifications improve the sensitivity of control charts.
 - b) Explain the concept of economic design of control charts. Develop the cost model and discuss how parameters such as sampling interval, sample size, and control limits are optimized.
- Q.2 Answer Any One of the following. 20**
- a) Explain moving average control charts and control charts based on extreme values. Compare their properties and applications with Shewhart charts.
 - b) Describe the change point model for process monitoring. Explain its formulation and how it helps in early detection of shifts in the process.
- Q.3 Answer Any One of the following. 20**
- a) Derive the least squares estimators in multiple linear regression. Discuss hypothesis testing for regression coefficients and construction of confidence intervals.
 - b) Explain the problem of autocorrelation in regression. Discuss its detection (e.g., Durbin-Watson test) and remedial measures.
- Q.4 Answer Any Two of the following. 20**
- a) Explain CUSUM control chart with its decision interval and reference value.
 - b) Discuss Bayesian control charts and their advantages over classical charts.
 - c) Explain regression adjustment in control charts with an example.

Q.5 Answer Any Two of the following. **20**

- a) Describe methods for generation of random numbers from probability distributions.
- b) Explain the Jackknife estimator, its properties, and limitations.
- c) **Write short notes on:**
 - . Activation functions in ANN
 - . Soft margin concept in Support Vector Machin (SVM)

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Ph.D. Course Work Examination: March/April – 2026
Zoology (Paper - 3)
Advanced Knowledge in Core Domain of Zoology
(Advanced Knowledge in - Zoology) (1025/ PHD-123)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw Diagram wherever necessary.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain basic concepts in non-chordates with evolutionary significance of segmentation, germ layers, protostomes and deuterostomes.
 b) Describe different methods used in the study of non-chordates.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Describe the evolution and diversification of birds from reptiles with suitable examples.
 b) Explain structure and functional significance of adrenal and thyroid glands.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Describe the Cell division with its significances.
 b) Explain applications of real time PCR, DNA microarray and DNA sequencing.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
 a) Give an account on Geographical distribution of monotremes and marsupials.
 b) Describe importance of conservation of diversity and endangered species.
 c) Explain the various events occurs during fertilization.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
 a) Give advantages and disadvantages of invasive insects and GMOs.
 b) Define cardiac cycle and describe the structure of mammalian heart.
 c) Write applications of restriction enzymes used in DNA technology.

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Ph.D. Course Work Examination: March/April - 2026
Microbiology (Paper - 3)
Advanced Knowledge in Core Domain of Microbiology
(Medical microbiology and Immunology) (1026/ PHD-156)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain the principle, types, and applications of Ag- Ab reactions in Serological diagnosis of infectious diseases.
 - b) Discuss various types of vaccines used in immunoprophylaxis.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe in detail the principles and procedures for collection of clinical samples for diagnosis.
 - b) Describe the molecular mechanisms of antimicrobial resistance.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Discuss the principle and classification of immunotherapy.
 - b) Explain the emergence and reemergence of viral diseases in India with special reference to Nipah virus, Chikungunya virus and Zika virus.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Explain the Polymerase Chain Reaction (PCR) in detail.
 - b) Explain the concept of Immunomodulation.
 - c) Describe the molecular evolution and antigenic variation in Influenza virus and it's implications for Pandemic.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) Explain the factors contributing to antimicrobial resistance.
 - b) Explain zygomycosis (mucormycosis) caused by zygomycetes , emphasizing it's sudden rise during the COVID -19 pandemic in India.
 - c) Write an account on monoclonal antibody based therapy.

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Ph.D. Course Work Examination: March/April – 2026
Microbiology (Paper - 3)
Advanced Knowledge in Core Domain of Microbiology
(Industrial and food Microbiology) (1027/ PHD-157)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

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

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe use of protective clothing in biosafety cabinets. Write on working and specifications of BSL-2 biosafety cabinets.
 - b) Take detailed account general steps involved in discarding biohazardous wastes. Write on autoclaving and incineration for discarding biohazardous wastes.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Discuss UV spectroscopy with respect to: Principle, working, applications, advantages and limitations.
 - b) Discuss 16S rRNA sequencing with respect to: Principle, protocol, significance, advantages and limitations.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) What are biosafety protocols related to biological weapons? Write on biosafety regulations and assessment of GMOs.
 - b) Discuss in detail national and international patent laws.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Describe sterilization process of media and air in batch and continuous fermentation.
 - b) Elaborate on biomass separation by centrifugation, filtration, flocculation and other recent developments.
 - c) Describe therapeutic applications of immobilized enzymes.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) Explain in detail the production of vinegar and alcohol.
 - b) Describe various techniques of biotransformation.
 - c) Write on biosynthesis of insect pheromones and ergot alkaloids.

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Ph.D. Course Work Examination: March/April – 2026
Microbiology (Paper - 3)
Advanced Knowledge in Core Domain of Microbiology
(Environmental and Agricultural Microbiology) (1028/ PHD-158)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

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

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Write an essay on recent advances in microbiological waste treatment methods.
 - b) Describe the mechanism of Nitrogen fixation in Rhizobium and explain in detail its production, formulation and application as a bio fertilizer.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe in detail habitats and mechanism of adaptations of microbes in hyper saline and soda lake environments.
 - b) Discuss in detail bioremediation of heavy metal, organic, and xenobiotic compounds.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe in detail the stages of wastewater treatment primary, secondary, and tertiary waste water treatment method.
 - b) Explain epidemiology of plant diseases and methods of biological control.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Describe the general characteristics and treatment of waste generated s by the Dairy industry.
 - b) Describe molecular biotechnological techniques used in bioremediation.
 - c) What is Membrane Bioreactors (MBR)? Discuss their design and optimization strategies for use in industrial sewage treatment.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) Discuss in detail *Bacillus thuringiensis* as a bio pesticide and their role in sustainable agriculture.
 - b) Explain the principles used for the isolation and enumeration of Methanogens from anaerobic environments.
 - c) Describe waste disposal regulations and environmental impact assessment (EIA & EA).

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Ph.D. Course Work Examination: March/April – 2026
Mathematics (Paper - 3)
Advanced Knowledge in Core Domain of Mathematics
3) Fuzzy Techniques and Applications (PHD-162)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Answer Any One of the following. **20**

- a) If A and B are fuzzy sets defined on X then prove that
1) $A \cup B = \bar{A} \cap \bar{B}$
2) $A \cap B = \bar{A} \cup \bar{B}$
b) State any five properties of α -cut and write the proof.

Q.2 Answer Any One of the following. **20**

- a) If $*$ $\in \{+, -, \cdot, /\}$ and A, B denote continuous fuzzy numbers then prove that $A * B$ is also continuous.
b) State and prove Second Decomposition theorem.

Q.3 Answer Any One of the following. **20**

- a) Write a short note on t-norms and their properties.
b) If $f : X \rightarrow Y$ is a crisp function then for any $A \in \mathcal{F}(X)$ then with usual notations prove that,
1) $\alpha^+[f(A)] = f(\alpha^+A)$
2) $\alpha[f(A)] \supseteq f(\alpha A)$

Q.4 Answer Any Two of the following. **20**

- a) Define Fuzzy intersection, Fuzzy Union, Standard fuzzy complement, Fuzzy Power set, Fuzzy Subset with one example each.
b) Write a short note on application on Fuzzy sets.
c) Prove that for any Fuzzy sets A and B defined on X , the following properties holds,
i) $A \cup (A \cap B) = A$
ii) $A \cap (A \cup B) = A$

Q.5 Answer Any Two of the following. **20**

- a) Write a short note on application of Fuzzy sets.
b) Define fuzzy relations and explain their types.
c) With usual notations and for $\alpha \in [0,1]$ prove that:
i) $A \subseteq B$ iff $\alpha A \subseteq \alpha B$
ii) $A \subseteq B$ iff $\alpha^+ A \subseteq \alpha^+ B$
iii) $A = B$ iff $\alpha A = \alpha B$
iv) $A = B$ iff $\alpha^+ A = \alpha^+ B$

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Ph.D. Course Work Examination: March/April – 2026
Applied Geology (Paper - 3)
Advanced Knowledge in Core Domain of Applied Geology
(1031/PHD-126)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Write detailed on Sample Preparation techniques, Principal, Theory and application of XRD and SEM in Geology.
 - b) Describe in detail about the petrological and geochemical characters of magmas in diverse tectonic setting.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe the provenance of the sediments based on heavy mineral analysis, and geochemical analysis of sediments.
 - b) Describe in detail the geomorphic markers of tectonic activities. Add a note on Holocene deformation and landscape response.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Write a detail account on occurrence and movement of groundwater. Add a note on 'rock properties affecting on groundwater'.
 - b) Describe in detail about the age of Deccan traps based on paleontological, paleo-magnetic and radiometric evidences. Add a note on 'inter-trappeans and infra-trappeans'.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Use of AAS in Earth Science
 - b) Shear zone
 - c) Concept of phase rule diagram
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) Stable isotope analysis
 - b) Stream-aquifer interaction
 - c) Stratigraphic correlation and pattern of Sedimentation

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
Geography (Paper - 3)
Advanced Knowledge in Core Domain of Geography
(Recent Trends Geography) (1032/ PHD-127)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
 २) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) २०
 अ) भूकंपाची कारणे आणि परिणाम स्पष्ट करा.
 ब) वातावरणीय दाब पट्टे आणि गृहीय वाऱ्याचे विश्लेषण करा.
- प्र.२ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. (दिर्घोत्तरी प्रश्न) २०
 अ) सखोल आणि विस्तृत शेतीचे वर्णन करा.
 ब) शेतीवर परिणाम करणारे घटक स्पष्ट करा.
- प्र.३ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
 अ) लोकसंख्या माहिती संकलनाचे स्रोत स्पष्ट करा.
 ब) भारतातील पर्यटन नियोजन आणि धोरणांचे वर्णन करा.
- प्र.४ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तर लिहा. (लघुत्तरी प्रश्न) २०
 अ) लोकसंख्येच्या माहितीचे विश्लेषणांची तंत्रे
 ब) पर्यटनाचे प्रकार
 क) स्थलांतराची कारणे
- प्र.५ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तर लिहा. (लघुत्तरी प्रश्न) २०
 अ) आर्थिक भूगोलाच्या अभ्यासाचे दृष्टिकोन
 ब) आर्थिक क्रियांचे वर्गीकरण
 क) वर्तणुकीय स्थान सिध्दांत

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Ph.D. Course Work Examination: March/April - 2026
Geography (Paper - 3)
Advanced Knowledge in Core Domain of Geography
(Recent Trends Geography) (1032/ PHD-127)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Describe the causes and effects of earthquake.
 b) Explain the atmospheric pressure belts and planetary winds.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Describe the intensive and extensive agriculture.
 b) Explain the factors affecting on agriculture.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain the sources of population data collection.
 b) Describe the tourism planning and policies in India.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
 a) Techniques of data analysis of population
 b) Types of tourism
 c) Causes of Migration
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
 a) Approaches to the study of economic geography
 b) Classification of economic activities
 c) Behavioural location theory

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Ph.D. Course Work Examination: March/April – 2026
Electronics (Paper - 3)
Advanced Knowledge in Core Domain of Electronics
(Recent Trends in Electronics) (1033/ PHD-129)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain Mixed signal SoC design with SoC design Methodology.
 b) Explain Wireless Sensor Networks and architecture of X bee module.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Write a brief explanation on IoT. Write a note on IIoT.
 b) Explain architecture of PSoC with digital and analog blocks.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain comparison between RF module, Bluetooth and X-bee. Which IDE is used for Programming of the X-bee? Explain it in detail.
 b) Explain general block diagrams of Actel ProASIC 3 and cypress PSoC.
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- | | |
|---|----|
| a) Explain Digital Processing of Speech Signals. | 10 |
| b) Write a brief note on IoT Communication technologies. | 10 |
| c) Give the brief explanation on AI and Machine Learning. | 10 |
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- | | |
|--|----|
| a) Explain the architecture of LPC 2148 ARM microcontroller. | 10 |
| b) Write a brief note on Digital Image Processing. | 10 |
| c) Explain Intelligent Electronics Systems. | 10 |

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Ph.D. Course Work Examination: March/April – 2026
Computer Science (Paper - 3)
Advanced Knowledge in Core Domain of Computer Science
(1034/ PHD-130)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) What is Data Mining? State and explain various Data mining Task Primitives with suitable example.
 - b) What is Classification? Explain decision tree induction method with example.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe the role of Tokenization and Stemming in reducing the dimensionality of the feature space in NLP.
 - b) Explain the architecture of a Paninian Parser.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain in detail the fundamental steps in Digital Image Processing with a neat block diagram. Discuss the role of each step.
 - b) Discuss point processing operations such as image negative, log transformation, and power-law transformation.
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- a) What is Cleaning? Explain the different strategies to clean the data. **10**
 - b) Discuss the fundamental requirements of a computational grammar for building a robust Language Structure and Analyzer. **10**
 - c) Explain fundamental operations such as erosion and dilation with examples. **10**
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- a) What is Concept Hierarchy? Explain different types of Concept hierarchies in data mining. **10**
 - b) Distinguishing between the functions of the Core parser and the Constraint parser. **10**
 - c) Explain global and adaptive thresholding techniques with examples. **10**

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Ph.D. Course Work Examination: March/April – 2026
Biotechnology (Paper - 3)
Advanced Knowledge in Core Domain of Biotechnology
(1036/ PHD-131)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain molecular markers (RFLP, AFLP, microsatellites, RAPD, QTL) and describe their role in marker-assisted selection.
 - b) Explain somatic embryogenesis and describe the method and applications of synthetic seeds.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain the principles behind stem cell-based regenerative medicine and its advantages and limitations.
 - b) Discuss the principles of media design, media optimization, and sterilization methods used in upstream processing.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Discuss the mechanism of transcription and post transcriptional modifications in eukaryote.
 - b) Add a brief note on Solid waste management and explain the bioremediation of xenobiotics.
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- a) Write a note on Molecular Pharming with suitable example. **10**
 - b) Define Transgenic plants and add a note on BT cotton. **10**
 - c) Explain the industrial production and recovery of penicillin. **10**
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- a) Explain the mechanism of T-DNA transfer to plants. **10**
 - b) Write a note on pairwise sequence analysis (BLAST). **10**
 - c) Write a note on ANOVA. **10**

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Ph.D. Course Work Examination: March/April – 2026
Pharmacy (Paper – 3)

Advanced Knowledge in Core Domain of Pharmacy (1037/ PHD-132)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe the complete drug development process from discovery to post-marketing surveillance.
 - b) Discuss the general principles of preclinical screening, including selection of animal models and endpoints.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Explain the principles and importance of Good Laboratory Practice (GLP) in preclinical research.
 - b) Describe the physicochemical properties of Active Pharmaceutical Ingredients (APIs) and their impact on formulation development.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Define controlled drug delivery systems and explain their advantages over conventional dosage forms.
 - b) Explain different methods of isolation and purification of plant constituents.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Discuss various methods for evaluation of drug release from SR/CR formulations.
 - b) Explain different types of toxicity studies: acute, sub-acute, sub-chronic, and chronic toxicity.
 - c) Discuss various phases of clinical trial and their objectives.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a) Describe the principle, instrumentation, and applications of UV spectroscopy in drug analysis.
 - b) Describe prodrug approaches and their advantages in improving drug properties.
 - c) Give the co-relation between animal models and human situations.

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Ph.D. Course Work Examination: March/April – 2026
Mechanical Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Mechanical Engineering -
Design Engineering (1039/ PHD-134)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary and state it clearly.
 - 4) Use of scientific calculator is allowed.

Q.1 Answer Any One of the following. 20

- a) Formulate the optimization problem for a multivariable unconstrained function using the necessary and sufficient conditions for stationary points, and apply the direct search method (e.g., simplex search) to find the optimum design variables for a truss structure minimizing weight subject to stress constraints. Design a two-factor full factorial experiment for optimizing a machining process parameter (e.g., speed and feed) using fixed effects model; estimate model parameters, check adequacy, and interpret p-values for main effects and interaction. Evaluate the use of Genetic Algorithm versus Simulated Annealing for multi-objective optimization in gear design, comparing convergence rates and Pareto fronts from a numerical example.
- b) Derive the stress transformation equations and principal stresses using Mohr's circle for a plane stress state at a point in a pressure vessel under combined loading (internal pressure and axial force). Apply Castigliano's theorem to compute deflections in a symmetrical beam subjected to bending and torsion; include numerical evaluation for a cantilever with point load and torque. Evaluate failure using von Mises yield criterion versus Tresca for a shaft under combined bending and torsion, determining the factor of safety and design modification for material yield strength of 400 MPa.

Q.2 Answer Any One of the following. 20

- a) Formulate Prandtl's stress function for torsion of a non-circular shaft (e.g., elliptical cross-section) and compute maximum shear stress using membrane analogy. Analyze buckling of a pinned-pinned column using energy methods (Rayleigh-Ritz); approximate the critical load and compare with Euler's formula for $E = 200 \text{ GPa}$, $L = 2m$.
 For a thick-walled cylinder under internal pressure, derive Lamé's equations for radial and hoop stresses; assess stress concentration and recommend wall thickness ratio for hoop stress limit of 300 MPa.

- b) Derive Lagrange's equations for a double pendulum system; solve for natural frequencies and mode shapes from the eigenvalue problem. Perform kinematic synthesis (graphical and analytical) for a four-bar mechanism for path generation; compute coupler curve and transmission angles. Analyze forward dynamic response of a slider-crank mechanism under harmonic forcing, evaluating joint forces and accelerations numerically.

Q.3 Answer Any One of the following. 20

- a) Formulate equations of motion for a 2-DOF vibratory system using matrix form; compute orthogonality of modes and response to initial conditions via modal superposition. Design a vibration absorber for a single-DOF machine ($\omega_n = 100$ rad/s, $k = 10$ kN/m); tune parameters for zero response at operating frequency and sketch frequency response. Evaluate balancing of a reciprocating engine with multiple pistons; compute shaking forces and recommend counterweights for primary/secondary force cancellation.
- b) State and derive Gruebler's (Kutzbach) criterion for the mobility (degrees of freedom) F of a planar mechanism. Apply it to a four-bar linkage (number of links $n = 4$, lower pairs $j = 4$, no higher pairs) to find F . Define the terms link, kinematic pair, mechanism, and machine, giving one example of each.

Q.4 Answer Any Two of the following.

- a) Develop the mathematical model for a response surface methodology experiment on injection molding, including second-order polynomial fitting and steepest ascent path determination. Apply Taguchi's orthogonal array (L9) to a three-factor process (e.g., temperature, pressure, time); compute signal-to-noise ratio and perform ANOVA to identify significant factors. **10**
- b) Discretize a 2D boundary value problem (plane stress plate) into triangular elements; derive element stiffness matrix using linear interpolation functions and assemble global matrix. Apply convergence criteria and compatibility requirements to refine mesh for a beam bending problem; compute displacement error and post-process stress contours. **10**
- c) Mechanical components can fail in many ways under uncertainty. Explain at least five typical failure modes or causes for a loaded structural component (e.g. *insufficient material thickness, vibration fatigue, tolerance build-up, material defects, overload, etc.*) **10**

Q.5 Answer Any Two of the following.

- a) Explain how a Design FMEA (Failure Modes & Effects Analysis) uses severity, occurrence, and detection ratings to calculate a Risk Priority Number (RPN), and how this process improves design reliability. Describe briefly how Quality Function Deployment (QFD) - the "House of Quality" - is used to translate customer requirements into design targets that mitigate such failures. **10**

- b)** Explain the concept of vibration exciters and discuss their role in vibration testing. Also explain the basic principles of signal analysis used in vibration measurement systems with suitable example. **10**
- c)** Consider the four-bar linkage $ABCD$ with ground link $AD = 150$ mm, crank $AB = 40$ mm rotating at 120 rpm, coupler $BC = 150$ mm, and rocker $CD = 80$ mm, with joint D fixed. Using the relative-velocity (instant center) method, determine the angular velocity of link CD when $\angle BAD = 60^\circ$. **10**

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Ph.D. Course Work Examination: March/April – 2026
Mechanical Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Mechanical Engineering -
Manufacturing Engineering (1040/ PHD-135)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) Compare bracketing methods and region-elimination methods in terms of efficiency, convergence, and limitations. Provide example for each.
 - b) Describe the principles of response surface methodology. How does RSM help in optimization of complex systems? Illustrate with a case study.
- Q.2 Answer Any One of the following. 20**
- a) Evaluate common welding defects and inspection methods.
 - b) Analyze melting, pouring, and solidification phenomena in casting. How do they influence defect formation?
- Q.3 Answer Any One of the following. 20**
- a) Explain the working principles of rolling, forging, extrusion, and highlight their applications.
 - b) Classify composite materials based on matrix and topology. Provide examples.
- Q.4 Answer Any Two of the following.**
- a) Explain the different types of errors in measurement instruments. **10**
 - b) Discuss tribological parameters affecting friction and wear. **10**
 - c) Describe the applications of image processing in modern metrology. Discuss their significance in improving measurement accuracy and quality control. **10**
- Q.5 Answer Any Two of the following.**
- a) Describe the Working principle, advantages, and applications of Abrasive Flow Machining (AFM). **10**
 - b) Describe the principles of assembly engineering. Why are they important in manufacturing? **10**
 - c) Discuss high energy rate forming and electroforming processes with their advantages and applications. **10**

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Ph.D. Course Work Examination: March/April – 2026
Mechanical Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Mechanical Engineering -
Thermal and Heat Power Engineering (1041/ PHD-136)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- Explain the use of design of experiments (DOE) in thermal problems.
 - Describe the use of Taguchi method in thermal analysis.
- Q.2 Answer Any One of the following. 20**
- Derive the Navier-Stokes equations for an incompressible viscous fluid.
 - Distinguish between Eulerian and Lagrangian approaches of fluid flow description. Define pathlines, streaklines, and streamlines with examples.
- Q.3 Answer Any One of the following. 20**
- Define uncertainty analysis in the experimental measurements.
 - Describe the Finite Element Method (FEM) procedure for solving a model boundary value problem.
- Q.4 Answer Any Two of the following.**
- Discuss bubble dynamics in pool boiling. Explain the different regimes on a boiling curve (nucleate, critical, film boiling) with a neat sketch. **10**
 - Explain the concept of radiation shape factor. **10**
 - Describe heat exchanger design theory with assumptions. **10**
- Q.5 Answer Any Two of the following.**
- Describe the sources of emissions in IC engines (HC, CO, NO_x, PM). Explain the role of engine electronics (ECU, EGR, catalytic converters) in emission control with a suitable block diagram. **10**
 - Explain the construction and use of a psychrometric chart. And discuss psychrometric processes. **10**
 - Discuss the combustion phenomenon in the internal combustion engine. How does the fuel/air mixture requirement influence engine performance and emissions? **10**

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Ph.D. Course Work Examination: March/April – 2026
Electronics and Telecommunication Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Electronics and
Telecommunication Engineering – Advances in Telecommunication
(1042/ PHD-137)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) With respect to Cognitive Radio Networks, explain various Spectrum Access and Sharing techniques.
 - b) Explain Green Communication. Also explain how energy efficiency is achieved in LTE networks.
- Q.2 Answer Any One of the following. 20**
- a) Explain Network Optimization and what are different utilities used for optimization? Explain the process with respect to any one utility by giving an appropriate example.
 - b) What make MIMO model fundamentally different than conventional transmit scenarios? And how capacity of MIMO system be improved.
- Q.3 Answer Any One of the following. 20**
- a) Explain block-chain technology architecture. Illustrate the working of block-chain technology.
 - b) In 5G, explain mobility management and dynamic reconfiguration. Also explain how 5G Communication helps for interference management.
- Q.4 Answer Any Two of the following. 20**
- a) Why Smart Antenna system is required? What are various types of Smart Antennas?
 - b) Explain Sensing mechanism in Cognitive radio.
 - c) Explain Cooperative Communication with its merits and de-merits.
- Q.5 Answer Any Two of the following. 20**
- a) Explain threats associated with respect to e-business. How these threats can be prevented and security can be improved.
 - b) What is mean by millimeter wave channel model in 5G?
 - c) Explain Cooperative signaling methods and their performance.

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Ph.D. Course Work Examination: March/April – 2026
Electronics and Telecommunication Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Electronics and
Telecommunication Engineering – Machine Learning
(1043/ PHD-138)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Q.1 Answer Any Two of the following. 20

- a)** Prove that the Candidate Elimination Algorithm correctly computes the version space.
 Include:
- i) Formal reasoning
 - ii) Invariants maintained during updates
 - iii) Conditions under which the algorithm fails
- b)** Explain how conjunctive concepts are learned.
 Compare:
- i) Find-S algorithm
 - ii) Candidate Elimination Algorithm
- Discuss their strengths, weaknesses, and assumptions about noise in data.
- c)** Design a concept learning system for a real-world application (e.g., spam detection or medical diagnosis).
 Define:
- i) Attributes
 - ii) Hypothesis representation
 - iii) Learning algorithm
- Discuss challenges and solutions

Q.2 Answer Any One of the following. 20

- a)** For the following data set
- i) Construct a decision tree
 - ii) Select splitting attributes using information gain
 - iii) Discuss overfitting issues
 - iv) Suggest pruning strategies
 - v) Analyze real-world challenges

Outlook	Temperature	Humidity	Windy	Play Tennis
Sunny	Hot	High	False	No
Sunny	Hot	High	True	No
Overcast	Hot	High	False	Yes
Rainy	Mild	High	False	Yes
Rainy	Cool	Normal	False	Yes
Rainy	Cool	Normal	True	No
Overcast	Cool	Normal	True	Yes
Sunny	Mild	High	False	No
Sunny	Cool	Normal	False	Yes
Rainy	Mild	Normal	False	Yes
Sunny	Mild	Normal	True	Yes
Overcast	Mild	High	True	Yes
Overcast	Hot	Normal	False	Yes
Rainy	Mild	High	True	No

- b) Consider the following dataset of Loan approval Prediction. Perform the following.
- i) Entropy calculation
 - ii) Information gain
 - iii) Decision tree construction
 - iv) Overfitting & Noise

ID	Income	Credit Score	Student	Employment	Loan Approved
1	High	Good	No	Stable	Yes
2	High	Poor	No	Stable	No
3	Medium	Good	No	Stable	Yes
4	Low	Good	Yes	Unstable	Yes
5	Low	Poor	Yes	Unstable	No
6	Medium	Poor	Yes	Stable	Yes
7	High	Good	Yes	Stable	Yes
8	Medium	Good	No	Unstable	Yes
9	Low	Good	No	Stable	Yes
10	Medium	Poor	No	Unstable	No
11	High	Poor	Yes	Stable	Yes
12	Low	Good	Yes	Stable	Yes
13	Medium	Good	Yes	Stable	Yes
14	High	Good	No	Unstable	Yes

Q.3 Answer Any One of the following.

20

- a) Consider the following data in table and the value of $T = (3,2)$
- i) Compute the Euclidean distance from T to all points
 - ii) Classify using $k = 1, k = 3$
 - iii) Explain effect of k on bias and variance
 - iv) Discuss the limitation of KNN

Point	x1	x2	Class
A	1	1	+
B	2	2	+
C	3	3	-
D	6	5	-
E	7	7	-

- b) Describe the working of Support Vector Machines (SVM). Explain with a diagram and example.

Q.4 Answer Any One of the following.

20

- a) Given an input image(I) and kernel(K):

Input Image (4×4)

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

Kernel (2×2)

$$K = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

Where, Stride = 1, No Padding is used, Activation function = ReLU, Pooling = Max Pooling (2×2 , stride = 2)

- i) Perform convolution operation
 - ii) Apply ReLU activation
 - iii) Perform max pooling
 - iv) Flatten output
- b) Attempt the following.
- i) Explain how overfitting is addressed in PAC learning framework.
 - ii) Explain the concept of radial basis functions (RBF) in instance-based learning.

Q.5 Answer Any Two of the following.

20

- a) Explain adaptive hierarchical clustering. Compare it with traditional hierarchical clustering methods.
- b) Explain the Gaussian Mixture Model (GMM). How does it differ from k-means clustering?
- c) Explain active learning with ensembles. How does it reduce labelling effort?

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Ph.D. Course Work Examination: March/April – 2026
Electronics and Telecommunication Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Electronics and
Telecommunication Engineering –
Advances in Image and Video Processing (1044/PHD-139)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze the role of point processing and spatial filtering in image enhancement. Design an adaptive enhancement technique that dynamically adjusts to noise levels and lighting variations. Evaluate its performance compared to conventional methods.
 - b) Critically evaluate transform-based enhancement techniques such as Fourier and wavelet transforms. Design a frequency-domain filtering strategy for removing periodic noise and justify your design.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze the challenges involved in deinterlacing and frame rate conversion. Design an improved algorithm for high-quality video reconstruction and evaluate its effectiveness.
 - b) Evaluate the concept of motion estimation in video compression. Design a block-matching algorithm with optimization strategies and compare it with existing techniques.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze thresholding techniques (global, adaptive, and Otsu). Design a hybrid segmentation method combining thresholding and edge detection, and evaluate its performance.
 - b) Critically evaluate region-based segmentation methods (region growing, splitting, merging). Design a segmentation framework suitable for medical image analysis and justify your approach.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Analyze 3-D sampling techniques in video processing. Evaluate their impact on temporal resolution and motion representation.
 - b) Evaluate different video compression standards and formats. Design a strategy to balance compression efficiency and visual quality for streaming applications.

- c) Analyze the relationship between spatial resolution, intensity resolution, and data storage requirements. Propose optimization techniques for efficient storage without compromising quality.

Q.5 Answer Any Two of the following. (Short Answer Question) 20

- a) Analyze Wiener filtering and its limitations in practical scenarios. Design an improved restoration method to overcome these limitations. Analyze Wiener filtering and its limitations in practical scenarios.
- b) Evaluate blind deconvolution techniques in image restoration. Design an algorithm for restoring images without prior knowledge of degradation function.
- c) Critically analyze iterative restoration methods and multiframe restoration techniques. Propose a hybrid restoration framework and justify its effectiveness.

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Ph.D. Course Work Examination: March/April – 2026
Computer Science and Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Computer Science and
Engineering- Data Science & Machine Learning (1045/ PHD-140)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) Enlist the features required for a programming tools used to develop data science application. Explain the role of NumPy in numerical computing and it's advantages.
 - b) What is class imbalance problem? Describe different methods for addressing the *class imbalance problem* Illustrate how you can induce a quality classifier based on a large set of nonfraudulent examples and a very small set of fraudulent case for a banking application that uses a classifier to check against fraudulent credit card transactions.
- Q.2 Answer Any One of the following. 20**
- a) What is normal distribution and continuous distribution? Describe the characteristics of normal distribution and Explain it's significance in statistical analysis. Elaborate with example.
 - b) Define heuristic function with example. Explain working mechanism and limitations of hill climbing search. Elaborate the quality of heuristic function and it's impact on search process.
- Q.3 Answer Any One of the following. 20**
- a) What is linear regression? Explain linear regression model with normally distributed errors. Also describe any two applications of logistic regression.
 - b) What is Big Data? Explain the characteristics of Big data. Explain the need of data analysis? Differentiate between descriptive and prescriptive data analysis.
- Q.4 Answer Any Two of the following. 20**
- a) Explain in detail Hadoop distributed file system. List and explain various types of permissions in Hadoop distributed file system.
 - b) Discuss the steps in object recognition and the challenges involved in object recognition. Also describe the role of convolutional neural networks in addressing these challenges.

- c) Define constraint satisfaction problem. Illustrate with example how constraint satisfaction problem is formulated as a search problem.

Q.5 Answer Any Two of the following.

20

- a) What is Learning. Compare supervised and unsupervised learning. Explain reinforcement learning in detail.
- b) Explain the fundamental concept of deep learning and describe its application areas.
- c) Explain in detail association rule mining.

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Ph.D. Course Work Examination: March/April – 2026
Computer Science and Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Computer Science and
Engineering- Network Security and Cloud Computing
(1046/ PHD-141)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- a) What are the Issues in designing a routing protocol for ad hoc wireless network? Explain Destination Sequenced Distance Vector (DSDV) and Dynamic Source Routing (DSR) routing protocols.
 - b) Illustrate with diagram the operation of multicast routing protocols in adhoc wireless networks. Also explain Tree-Based, and Mesh-Based Multicast Routing Protocols.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Define Sensor Technology, Participatory Sensing, Industrial IoT, Automotive IoT, Explain various sensor data communication protocols.
 - b) Explain WPAN Technologies for IoT/M2M and Cellular and Mobile Network Technologies for IoT/M2M used for wireless networks. Give IPv6 Protocol Overview for the IoT.
- Q.3 Answer Any One of the following. 20**
- a) Discuss Cloud service models and cloud deployment models in detail.
 - b) Explain the Basics of virtualization, Server virtualization, VM migration techniques and Role of virtualization in Cloud Computing.
- Q.4 Answer Any Two of the following. 20**
- a) What are Security Threats to Computer Networks? Explain Sources of Security Threats.
 - b) What is an Intrusion Detection Systems (IDSs)? Explain different types of Intrusion Detection Systems.
 - c) What are different types of Firewalls? Explain Configuration and Implementation of a Firewall.
- Q.5 Answer Any Two of the following. 20**
- a) Explain Intrusion detection tools.
 - b) What is virus filtering and content filtering?
 - c) Discuss in detail Computer and Network Forensics. What are the different forensics tools.

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Ph.D. Course Work Examination: March/April – 2026
Computer Science and Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Computer Science and Engineering- Image Processing (1047/ PHD-142)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) List steps used for image analysis during pre-processing. Under what conditions are each of them used?
 - b) What is image restoration? state the techniques used. Illustrate the use of each.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) How is Morphological analysis of images performed? How are erosion and dilation dealt with?
 - b) How is image compression carried out? List and illustrate the standard techniques used for image compression.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) What is classification-based segmentation? Illustrate the process step by step.
 - b) What is Random forests? How is it used in Classification of images?
- Q.4 Answer Any Two of the following. (Short Answer Question)**
- a) How are images categorized? How is recognition done using the Bag of words? Illustrate **10**
 - b) How is least square method used in a 2-dimension feature based alignment? Illustrate. **10**
 - c) Demonstrate how Hidden Markov Model is used in image classification. Illustrate **10**
- Q.5 Answer Any Two of the following. (Short Answer Question)**
- a) Is a digital image a Signal? Justify and state the characteristics of an image. **10**
 - b) Compare and contrast between spatial and frequency domain filtering. **10**
 - c) Describe in detail the process of preparing a histogram of oriented gradient. What information does it contain? **10**

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Ph.D. Course Work Examination: March/April – 2026
Civil Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Civil Engineering
Advanced Knowledge in Structural Engineering & Concrete
Technology (1048/ PHD-143)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section-I

- Q.1 Answer Any Two of the following. 10**
- a) Discuss role of Artificial Intelligence in solving Civil Engineering problems.
 - b) State applications of CNN in Civil Engineering.
 - c) List any three non-destructive testing methods for concrete.
 - d) What is Environmental Audit?
- Q.2 Answer Any Two of the following. 20**
- a) A **2D truss element** has Node 1: (0,0), Node 2: (3 m, 4 m), Area $A = 300 \text{ mm}^2$ and $E = 200 \text{ GPa}$ Compute the element stiffness matrix in **local coordinates**. Transform it to **global coordinates**, and also write the final global stiffness matrix.
 - b) Explain plane stress vs plane strain also discuss the strain-displacement relationship in FEM.
 - c) Define the stiffness matrix of a beam element and explain assembly of global stiffness matrix.
 - d) What is a transformation matrix in structural analysis? Also, define the compatibility condition in FEM.
- Q.3 Answer Any Two of the following. 20**
- a) Discuss application of FEM in analysis of truss or beam.
 - b) What is a 3-noded element? Also, discuss the application of FEM in the analysis of a truss or beam.
 - c) Write various steps involved in the analysis using FEM.
 - d) Define the compatibility condition in FEM, and list types of finite elements.

Section-II

- Q.4 Answer Any Two of the following. 10**
- a) Define the eigenvalue problem.
 - b) What is regression analysis.
 - c) What do you mean by Standard Deviation and define normal distribution?
 - d) Discuss applications of statistical analysis in resource management.
 - e) Explain solution of linear equations in Civil Engineering problems.
- Q.5 Answer Any Two of the following. 20**
- a) List of various provisions of IS 13920.
 - b) What is Fibre Reinforced Concrete?
 - c) Discuss types and applications of special concretes, also explain shotcreting.
 - d) Explain different methods of dynamic analysis of a structure.
- Q.6 Answer Any Two of the following. 20**
- a) Explain earthquake-resistant design principles.
 - b) Define High Strength Concrete (HSC) also mention various steps in the design of High Strength Concrete Mix.
 - c) Write note provisions of confining reinforcement.
 - d) Define response spectrum.

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Ph.D. Course Work Examination: March/April – 2026
Civil Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Civil Engineering-
Advanced Knowledge in Geotechnical Engineering and
Construction Management (1049/ PHD-144)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

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

Q.1 Answer Any One of the following. 20

- a) Describe the standard laboratory and field tests used to measure dynamic soil properties. Explain how cyclic triaxial test results are used to evaluate soil strength under dynamic conditions.
- b) What is the significance of soil-structure interaction in the design of high-rise buildings? Compare the behavior of a high-rise building on a fixed base versus a flexible base using SSI concepts.

Q.2 Answer Any One of the following. 20

- a) What is Break-Even Analysis and how is it used in risk assessment of construction projects? Explain with an example and describe its limitations in practice.
- b) Explain the Economic Order Quantity (EOQ) model and its application in purchase planning for construction materials. How are lead time and demand variability accounted for in the model?

Q.3 Answer Any One of the following. 20

- a) What are the sources of subsurface contamination in urban areas? Describe the monitoring techniques and remediation strategies adopted in geo-environmental engineering practice.
- b) Explain network crashing in project scheduling. What are the steps involved in time-cost trade-off optimization? Illustrate with an example CPM network.

Q.4 Answer Any Two of the following. 20

- a) Explain the classification of fills used as foundation material. How is the bearing capacity of foundations on fills evaluated? What precautions are taken during construction?
- b) Describe the geotechnical reuse of industrial waste materials such as fly ash, slag, and mine tailings. What are the key engineering properties assessed before their use in construction?

- c) Describe various non-destructive testing (NDT) techniques used for concrete quality assurance in construction. Compare rebound hammer, ultrasonic pulse velocity, and carbonation tests.

Q.5 Answer Any Two of the following.**20**

- a) Explain the Line of Balance (LOB) technique for scheduling repetitive construction activities. How is it different from CPM? Give a practical application example.
- b) Explain the need for taxation in construction projects. Describe the types of taxes relevant to construction and their impact on project financial planning. What is the role of Debt-Equity Ratio?
- c) Explain multivariate analysis and the use of multiple regression in Civil Engineering resource management. How are regression models validated using statistical tests?

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Ph.D. Course Work Examination: March/April – 2026
Civil Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Civil Engineering-
Advanced Knowledge in Environmental Engineering and Water
Resources Engineering (1050/PHD-145)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat sketches wherever necessary.
 4) Use of nonprogrammable calculator is permitted.

- Q.1 Answer Any One of the following. 20**
- a) Explain water quality requirements for potable use. Discuss physical, chemical, and biological parameters with reference to 'World Health Organization'.
 - b) Describe the fundamentals of design of wastewater treatment systems. Explain primary, secondary, and tertiary treatment stages.
- Q.2 Answer Any One of the following. 20**
- a) Classify air pollutants based on origin, physical state, and chemical composition. Discuss major natural and anthropogenic sources.
 - b) Discuss transfer, recycling, and disposal techniques of municipal solid waste. Evaluate their environmental and economic impacts.
- Q.3 Answer Any One of the following. 20**
- a) Discuss the global distribution of water resources and compare it with the availability in India and Maharashtra. Highlight challenges such as regional disparities, groundwater depletion, and climate change impacts.
 - b) Discuss inter-basin water transfer and river linking projects in India. Highlight benefits, environmental concerns, and socio-economic impacts.
- Q.4 Answer Any Two of the following. 20**
- a) Explain Digital Elevation Models (DEM) and their applications in water resources engineering such as watershed delineation, flood modeling, and site selection.
 - b) Describe the structure and composition of the atmosphere.
 - c) Estimate runoff using Rational Method, Area = 50 ha, C = 0.6, Rainfall intensity = 50 mm/hr.

Q.5 Answer Any Two of the following.

- a) A statically determinate structure gives the following system:
 $2x + 3y - z = 5$, $4x + y + 2z = 6$, $-2x + 5y + 2z = 4$
Find x, y, z .
- b) Select a real-life Civil Engineering problem (such as urban flooding, traffic congestion, or water scarcity) and demonstrate how the 'Design Thinking' methodology can be applied step-by-step to solve it. Highlight stakeholder involvement, iterative design, and innovation in your answer.
- c) Describe various techniques used for testing concrete to ensure quality assurance. Include both destructive and non-destructive testing methods such as compressive strength test, rebound hammer test, ultrasonic pulse velocity test, and core testing. Compare their applicability, advantages, and limitations.

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Ph.D. Course Work Examination: March/April – 2026
Electronics Engineering (Paper - 3)
**Advanced Knowledge in Core Domain of Electronics Engineering-
 Machine Learning (1051/ PHD-160)**

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Q.1 Answer Any Two of the following. **20**

a) Prove that the Candidate Elimination Algorithm correctly computes the version space.

Include:

- i) Formal reasoning
- ii) Invariants maintained during updates
- iii) Conditions under which the algorithm fails

b) Explain how conjunctive concepts are learned.

Compare:

- i) Find-S algorithm
- ii) Candidate Elimination Algorithm

Discuss their strengths, weaknesses, and assumptions about noise in data.

c) Design a concept learning system for a real-world application (e.g., spam detection or medical diagnosis).

Define:

- i) Attributes
- ii) Hypothesis representation
- iii) Learning algorithm

Discuss challenges and solutions

Q.2 Answer Any One of the following. **20**

a) For the following data set

- i) Construct a decision tree
- ii) Select splitting attributes using information gain
- iii) Discuss overfitting issues
- iv) Suggest pruning strategies
- v) Analyze real-world challenges

Outlook	Temperature	Humidity	Windy	Play Tennis
Sunny	Hot	High	False	No
Sunny	Hot	High	True	No
Overcast	Hot	High	False	Yes
Rainy	Mild	High	False	Yes
Rainy	Cool	Normal	False	Yes
Rainy	Cool	Normal	True	No
Overcast	Cool	Normal	True	Yes
Sunny	Mild	High	False	No
Sunny	Cool	Normal	False	Yes
Rainy	Mild	Normal	False	Yes
Sunny	Mild	Normal	True	Yes
Overcast	Mild	High	True	Yes
Overcast	Hot	Normal	False	Yes
Rainy	Mild	High	True	No

- b) Consider the following dataset of Loan approval Prediction. Perform the following.
- i) Entropy calculation
 - ii) Information gain
 - iii) Decision tree construction
 - iv) Overfitting & Noise

ID	Income	Credit Score	Student	Employment	Loan Approved
1	High	Good	No	Stable	Yes
2	High	Poor	No	Stable	No
3	Medium	Good	No	Stable	Yes
4	Low	Good	Yes	Unstable	Yes
5	Low	Poor	Yes	Unstable	No
6	Medium	Poor	Yes	Stable	Yes
7	High	Good	Yes	Stable	Yes
8	Medium	Good	No	Unstable	Yes
9	Low	Good	No	Stable	Yes
10	Medium	Poor	No	Unstable	No
11	High	Poor	Yes	Stable	Yes
12	Low	Good	Yes	Stable	Yes
13	Medium	Good	Yes	Stable	Yes
14	High	Good	No	Unstable	Yes

Q.3 Answer Any One of the following.

20

- a) Consider the following data in table and the value of $T = (3,2)$
- i) Compute the Euclidean distance from T to all points
 - ii) Classify using $k = 1, k = 3$
 - iii) Explain effect of k on bias and variance
 - iv) Discuss the limitation of KNN

Point	x1	x2	Class
A	1	1	+
B	2	2	+
C	3	3	-
D	6	5	-
E	7	7	-

- b) Describe the working of Support Vector Machines (SVM). Explain with a diagram and example.

Q.4 Answer Any One of the following.

20

- a) Given an input image(I) and kernel(K):

Input Image (4×4)

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

Kernel (2×2)

$$K = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

Where, Stride = 1, No Padding is used, Activation function = ReLU, Pooling = Max Pooling (2×2 , stride = 2)

- i) Perform convolution operation
 - ii) Apply ReLU activation
 - iii) Perform max pooling
 - iv) Flatten output
- b) Attempt the following.
- i) Explain how overfitting is addressed in PAC learning framework.
 - ii) Explain the concept of radial basis functions (RBF) in instance-based learning.

Q.5 Answer Any Two of the following.

20

- a) Explain adaptive hierarchical clustering. Compare it with traditional hierarchical clustering methods.
- b) Explain the Gaussian Mixture Model (GMM). How does it differ from k-means clustering?
- c) Explain active learning with ensembles. How does it reduce labelling effort?

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Ph.D. Course Work Examination: March/April – 2026
Electronics Engineering (Paper - 3)
Advanced Knowledge in Core Domain of Electronics Engineering –
Advances in Image and Video Processing (1052/ PHD-161)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze the role of point processing and spatial filtering in image enhancement. Design an adaptive enhancement technique that dynamically adjusts to noise levels and lighting variations. Evaluate its performance compared to conventional methods.
 - b) Critically evaluate transform-based enhancement techniques such as Fourier and wavelet transforms. Design a frequency-domain filtering strategy for removing periodic noise and justify your design.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze the challenges involved in deinterlacing and frame rate conversion. Design an improved algorithm for high-quality video reconstruction and evaluate its effectiveness.
 - b) Evaluate the concept of motion estimation in video compression. Design a block-matching algorithm with optimization strategies and compare it with existing techniques.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Analyze thresholding techniques (global, adaptive, and Otsu). Design a hybrid segmentation method combining thresholding and edge detection, and evaluate its performance.
 - b) Critically evaluate region-based segmentation methods (region growing, splitting, merging). Design a segmentation framework suitable for medical image analysis and justify your approach.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) Analyze 3-D sampling techniques in video processing. Evaluate their impact on temporal resolution and motion representation.
 - b) Evaluate different video compression standards and formats. Design a strategy to balance compression efficiency and visual quality for streaming applications.

- c) Analyze the relationship between spatial resolution, intensity resolution, and data storage requirements. Propose optimization techniques for efficient storage without compromising quality.

Q.5 Answer Any Two of the following. (Short Answer Question) 20

- a) Analyze Wiener filtering and its limitations in practical scenarios. Design an improved restoration method to overcome these limitations. Analyze Wiener filtering and its limitations in practical scenarios.
- b) Evaluate blind deconvolution techniques in image restoration. Design an algorithm for restoring images without prior knowledge of degradation function.
- c) Critically analyze iterative restoration methods and multiframe restoration techniques. Propose a hybrid restoration framework and justify its effectiveness.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Education (Paper - 3)

Advanced Knowledge in Core Domain of Education (1054/PHD-115)

वार, दिनांक: शनिवार, ०२-०५-२०२६

कमाल गुण: १००

वेळ: सकाळी ११:०० ते ०२:००

- सूचना :** १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०**
- अ) सातत्यपूर्ण आणि सर्वकष मूल्यमापन प्रणाली म्हणजे काय? शिक्षकांच्या उत्तरदायित्वाचे विविध पैलू स्पष्ट करा.
- ब) सर्व समावेशक शिक्षणाची संकल्पना स्पष्ट करा आणि विविध गरजा असलेल्या विद्यार्थ्यांना मुख्य प्रवाहातील शाळांमध्ये समाविष्ट करण्यासाठी शिक्षक, पालक आणि समुदाय यांची भूमिका स्पष्ट करा.
- प्र.२ खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०**
- अ) शिक्षक क्षमता, शिक्षक बांधिलकी आणि शिक्षक कामगिरी या संकल्पना उदाहरणासह स्पष्ट करा. शिक्षकांमध्ये क्षमता वाढविण्यासाठी, शिक्षकामध्ये बांधिलकीची भावना वाढविण्यासाठी आणि शिक्षकाची कामगिरी उंचावण्यासाठी आपण कोणत्या उपाययोजना सुचवाल?
- ब) बौद्धिक अक्षमता असलेल्या मुलांची कारणे, वैशिष्ट्ये आणि शैक्षणिक धोरणे स्पष्ट करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०**
- अ) शिक्षक शिक्षणाची संकल्पना आणि ध्येय स्पष्ट करा. शिक्षकाच्या विचार प्रक्रियेचे घटक आणि शिक्षकाच्या विचारप्रक्रियेवर परिणाम करणारे घटक स्पष्ट करा.
- ब) राष्ट्रीय अपंग वित्त आणि विकास महामंडळाची स्थापना आणि उद्दिष्टे स्पष्ट करा. भारत सरकारने अपंग व्यक्तींच्या कल्याण आणि सक्षमीकरणासाठी राबविलेल्या विविध योजना आणि तरतुदी स्पष्ट करा.
- प्र.४ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०**
- अ) प्रकल्प आधारित अध्ययनाची संकल्पना, प्रमुख वैशिष्ट्ये स्पष्ट करा. प्रकल्प आधारित अध्ययन पारंपरिक अध्यापन पद्धतीपेक्षा कसे वेगळे आहे?
- ब) अध्यापन कार्यनिती व अध्यापन पद्धती यांमधील फरक स्पष्ट करा. सहयोगी अध्यापन कार्यनिती वैशिष्ट्ये स्पष्ट करा.
- क) भारतातील शिक्षक-शिक्षण प्रणालीची रचना, तिचे फायदे आणि तोटे स्पष्ट करा.

- प्र.५ खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
- अ) ई-लर्निंग कार्यनिती म्हणजे काय? आधुनिक डिजिटल शिक्षण व्यवस्थेमध्ये ई-लर्निंगचे महत्त्व स्पष्ट करा.
- ब) क्लाउड कॉम्प्युटिंगची वैशिष्ट्ये सांगून शैक्षणिक संस्थांमध्ये क्लाउड कॉम्प्युटिंगच्या वापराचे फायदे आणि मर्यादा स्पष्ट करा.
- क) विविध क्षमता असलेल्या मुलांसाठी समावेशनातील आव्हाने स्पष्ट करा.

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**Ph.D. Course Work Examination: March/April - 2026
Education (Paper - 3)**

Advanced Knowledge in Core Domain of Education (1054/PHD-115)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- What is a continuous and comprehensive evaluation system? Explain the various aspects of teacher's accountability.
 - Explain the concept of inclusive education and discuss the role of teachers, parents, and the community in supporting the inclusion of children with diverse needs in mainstream schools.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- Explain, with suitable examples, the concepts of teacher competence, teacher commitment, and teacher performance. What measures would you suggest to increase the capacity of teachers, increase the sense of commitment among teachers, and improve teacher performance?
 - Explain the causes, characteristics and educational policies of children with intellectual disabilities.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- Explain the concept and aims of teacher education. Explain the components of a teacher's thought process and the factors that affect a teacher's thought process.
 - Explain the establishment and objectives of the National Disabled Finance and Development Corporation. Discuss various schemes and provisions implemented by the Government of India for the welfare and empowerment of persons with disabilities.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- Explain the concept and key features of project-based learning. How is project-based learning different from traditional teaching methods?
 - Explain the difference between teaching methodology and teaching Strategy. Explain the characteristics of collaborative teaching Strategy.
 - Explain the structure of the teacher education system in India, its advantages and disadvantages.

Q.5 Answer Any Two of the following. (Short Answer Question) 20

- a)** What is e-learning Strategies? Explain the importance of e-learning in the modern digital education system.
- b)** Explain the features of cloud computing. Explain the advantages and limitations of using cloud computing in educational institutions.
- c)** Explain the challenges of inclusion for children with diverse.

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Ph.D. Course Work परीक्षा: मार्च / एप्रिल – २०२६
Physical Education (Paper - 3)
Advanced Knowledge in Core Domain of Physical Education
(1055/ PHD-116)

वार, दिनांक: शनिवार, ०२-०५-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: १००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
- अ) व्यायाम शरीरक्रिया विज्ञानातील (Exercise Physiology) नवीन प्रवाहांचे वर्णन करा. शारीरिक शिक्षण आणि क्रीडा विज्ञान संशोधनामध्ये शरीरक्रिया विज्ञानाची व्याप्ती स्पष्ट करा.
- ब) क्रीडा मानसशास्त्राचा अर्थ, व्याप्ती आणि विकास काय आहे? त्याची गरज, महत्त्व आणि इतर क्रीडा विज्ञानांशी असलेले संबंध स्पष्ट करा.
- प्र.२ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
- अ) व्यायाम शरीरक्रिया विज्ञानाची व्याख्या सांगून त्याची उद्दिष्टे स्पष्ट करा. व्यायाम आणि प्रशिक्षणाचा मानवी शरीरावर होणारा परिणाम स्पष्ट करा. (न्यूरॉमस्कुलर व बायोएनर्जेटिक्स बाबींसह).
- ब) मानसशास्त्रीय सिद्धांत आणि त्यांचे क्रीडा व खेळांमधील उपयोग यावर चर्चा करा. तणाव व्यवस्थापन तंत्रे खेळाडूंची कामगिरी कशी सुधारू शकतात याची चर्चा करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. (दिर्घोत्तरी प्रश्न) २०
- अ) क्रीडा आणि खेळांमध्ये जैवयांत्रिकीचे (Biomechanics) महत्त्व स्पष्ट करा. न्यूटनचे नियम, प्रक्षेपण (Projection), बल (Force), लीव्हर (Levers) आणि ऊर्जा यांचे क्रीडेतील उपयोजन उदाहरणांसह स्पष्ट करा.
- ब) शारीरिक शिक्षण आणि क्रीडामध्ये शरीररचना (Anatomy) व काइनेसीयोलॉजी (Kinesiology) यांची व्याप्ती व क्षेत्रे स्पष्ट करा. क्रीडा प्रशिक्षण पद्धती विकसित करण्यात त्यांची भूमिका यावर सविस्तर चर्चा करा.

- प्र.४ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
- अ) बायोएनर्जेटिक्सचे शरीरक्रियाविज्ञान काय आहे? क्रीडेमध्ये त्याचे महत्त्व स्पष्ट करा.
- ब) क्रीडा मानसशास्त्रात वापरल्या जाणाऱ्या कोणत्याही तीन व्यक्तिमत्व गुणवैशिष्ट्ये चाचण्या लिहा व स्पष्ट करा.
- क) शारीरिक शिक्षण आणि क्रीडा विज्ञान संशोधनामध्ये शरीररचना व काइनेसीयोलॉजीचा व्याप्ती काय आहे?
- प्र.५ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. (लघुत्तरी प्रश्न) २०
- अ) क्रीडा विज्ञान संशोधनामध्ये मूल्यमापनासाठी वापरल्या जाणाऱ्या सॉफ्टवेअरचे प्रकार आणि त्यांचे महत्त्व स्पष्ट करा.
- ब) न्यूरोमस्क्युलर शरीरक्रियाविज्ञानाची व्याख्या करा आणि व्यायामामधील त्याची भूमिका स्पष्ट करा.
- क) पर्यावरणाचा मार्गदर्शन आणि प्रशिक्षणावर कसा परिणाम होतो? उदाहरणांसह स्पष्ट करा.

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Ph.D. Course Work Examination: March/April – 2026
Physical Education (Paper - 3)
Advanced Knowledge in Core Domain of Physical Education
(1055/PHD-116)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe new trends in exercise physiology. Discuss the scope of physiology in physical education and sports sciences research.
 - b) What is the meaning, scope, and development of sports psychology? Explain its need, importance, and relationship with other sports sciences.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- a) Define exercise physiology and its aims and objectives. Explain the effects of exercise and training on human physiology, including neuromuscular and bioenergetics aspects.
 - b) Discuss psychological theories and their applications in sports and games. How can stress management techniques improve athlete performance?
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- a) Describe the importance of biomechanics in sports and games. Illustrate with examples of Newton's laws, projection, force, levers, and energy applications.
 - b) Explain the area and scope of anatomy and kinesiology in physical education and sports. Discuss how they help in developing sports training methods.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- a) What is the physiology of bioenergetics? Explain its importance in sports.
 - b) List and explain any three personality characteristic tests used in sports psychology.
 - c) What is the scope of anatomy and kinesiology research in physical education and sports sciences?

Q.5 Answer Any Two of the following. (Short Answer Question) 20

- a)** Explain the types of software used in evaluation for sports science research and their importance.
- b)** Define neuromuscular physiology and its role in exercise.
- c)** How does the environment affect coaching and training? Give examples.

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Ph.D. Course Work परीक्षा: मार्च/एप्रिल – २०२६
Library and Information Science (Paper - 3)
Advanced Knowledge in Core Domain of Library and Information Science (1057/PHD-117)

वार, दिनांक: शनिवार, ०२-०५-२०२६
वेळ: सकाळी ११:०० ते ०२:००

कमाल गुण: १००

सूचना : १) सर्व प्रश्न अनिवार्य आहेत.
२) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र.१ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. २०
- अ) वेब २.० म्हणजे काय? ग्रंथालय २.० ची संकल्पना आणि त्याची वैशिष्ट्ये स्पष्ट करा. वेब २.० ने ग्रंथालय सेवा आणि वापरकर्त्यांच्या सहभागावर कसा प्रभाव पाडला आहे ते सांगा.
- ब) ग्रंथालय आणि माहिती विज्ञान (LIS) केंद्रांच्या विकासात माहिती आणि संप्रेषण तंत्रज्ञान (ICT) च्या भूमिकेवर चर्चा करा. ग्रंथालयांच्या कार्यात त्यामुळे कसे बदल झाले आहेत?
- प्र.२ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. २०
- अ) डिजिटल ग्रंथालय म्हणजे काय? डिजिटल ग्रंथालये स्थापन आणि व्यवस्थापित करण्याची प्रमुख वैशिष्ट्ये फायदे आणि आव्हाने स्पष्ट करा.
- ब) Institutional Repository म्हणजे काय? त्याचे महत्त्व, फायदे आणि शैक्षणिक ज्ञान जतन करण्यात त्याची भूमिका यावर चर्चा करा.
- प्र.३ खालील कोणत्याही एका प्रश्नाचे उत्तर द्या. २०
- अ) वाङ्मय चौर्य म्हणजे काय? त्याचे प्रकार, कारणे आणि संशोधनात ते कसे रोखता येईल ते स्पष्ट करा. वाङ्मय चौर्यबद्दल जागरुकता निर्माण करण्यात ग्रंथालयांची भूमिका यावर चर्चा करा.
- ब) शैक्षणिक संशोधन संस्थेत ई-संसाधनांची भूमिका स्पष्ट करा. ई-संसाधनांच्या उपलब्धतेमुळे संशोधन कसे केले जाते आणि ते जीवनव्यापी शिक्षणाला कसे समर्थन देतात यावर चर्चा करा.

- प्र.४ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. २०
- अ) SWOT विश्लेषण म्हणजे काय आणि ते मानव संसाधन व्यवस्थापन (HRM) मध्ये कसे वापरले जाते?
- ब) कार्य विश्लेषणाची संकल्पना परिभाषित करा आणि मानव संसाधन संशोधनात त्याचे महत्त्व स्पष्ट करा.
- क) प्रेरणा म्हणजे काय आणि ती कर्मचाऱ्यांच्या कामगिरीवर कसा परिणाम करते?
- प्र.५ खालील कोणत्याही दोन प्रश्नांची उत्तरे द्या. २०
- अ) ब्रेन स्टोर्मिंग म्हणजे काय आणि ते समस्या सोडवण्यासाठी कसे वापरले जाते?
- ब) माइंड मॅपिंग म्हणजे काय आणि ते कल्पनांचे आयोजन करण्यात कसे मदत करते?
- क) TQM मध्ये सतत सुधारणा करण्याची गरज स्पष्ट करा.

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Ph.D. Course Work Examination: March/April - 2026
Library and Information Science (Paper - 3)
Advanced Knowledge in Core Domain of Library and Information Science (1057/PHD-117)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Answer Any One of the following. **20**

- a) What is Web 2.0? Explain the concept of Library 2.0 and its features. How has Web 2.0 influenced library services and user engagement?
- b) Discuss the role of Information and Communication Technology (ICT) in the development of Library and Information Science (LIS) centres. How has it transformed the functioning of libraries.

Q.2 Answer Any One of the following. **20**

- a) What is a digital library? Explain the key features, advantages, and challenges of establishing and managing digital libraries.
- b) What is an institutional repository? Discuss its importance, benefits, and the role it plays in preserving academic knowledge and facilitating access to research outputs.

Q.3 Answer Any One of the following. **20**

- a) What is plagiarism? Explain its types, causes, and how it can be prevented in academic writing and research. Discuss the role of libraries in creating awareness about plagiarism.
- b) Explain the role of e-resources in the academic research ecosystem. Discuss how the availability of e-resources has transformed the way research is conducted and how they support lifelong learning.

Q.4 Answer Any Two of the following. **20**

- a) What is a SWOT analysis, and how is it used in Human Resource Management (HRM)?
- b) Define the concept of job analysis and explain its importance in HR research.
- c) What is motivation, and how does it impact employee performance?

Q.5 Answer Any Two of the following. **20**

- a) What is brainstorming, and how is it used in problem-solving?
- b) What is mind mapping, and how does it help in organizing ideas?
- c) Explain the concept of continuous improvement in TQM.

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Ph.D. Course Work Examination: March/April – 2026
Social Work (Paper - 3)
Advanced Knowledge in Core Domain of Social Work-Human
Resource Management (1059/ PHD-152)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
- Explain the various functions of HRM and which functions do you believe is the most crucial in today's work environment and why?
 - Discuss the role of training and development in HRD. How does it impact employee performance and organisational productivity?
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- Explain how changes in the external environment, such as economic shifts or technological advancements, impact Human Resource Planning.
- OR**
- How do job analysis and job description contribute to effective recruitment and selection processes?
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- What are the key challenges in the recruitment and selection process, and how can they be addressed?
- OR**
- Discuss the impact of effective career planning employee retention and motivation.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- Discuss the relationship between leadership styles and organizational behavior.
 - Explain the concept of scalability in organizational growth. Why is it important for sustainable development?
 - Discuss the evolution of labour welfare practices over time.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- Evaluate the effectiveness of the social security system in addressing employee problems.
 - Identify and discuss emerging trends in collective bargaining. How are they shaping the industrial relations environment?
 - How does the Maternity Benefit Act, 1961 promote the welfare of working women? What are its key features?

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Ph.D. Course Work Examination: March/April – 2026
Social Work (Paper - 3)
Advanced Knowledge in Core Domain of Social Work-Urban Rural
and Tribal Community Development (1060/PHD-153)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the meaning and types of Community Development.
b) Explain the Nature and Objective of Rural Community Development.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the characteristics of tribal community development.
b) Describe the main provisions of 73rd Amendment Bill.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
a) Explain the concept and functions of Panchayat Raj Institution.
b) Describe meaning and types of small scale industries.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
a) Meaning and principles of community organization.
b) Concept and importance of extension education.
c) Concept of participation in tribal community development.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
a) Main provisions of 74th Amendment Bill.
b) Importance of people's participation in rural community development.
c) Gandhian perspective for rural development.

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Ph.D. Course Work Examination: March/April – 2026
Social Work (Paper - 3)
Advanced Knowledge in Core Domain of Social Work-Family and
Child Development (1061/PHD-154)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Describe the functions & initiatives of NCW for women empowerment.
 b) Explain the School Social Work Concept and its Scope in parenting.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Write the Priority Areas of National Youth Policy 2014.
 b) Review the programmes of government for holistic child development.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Discuss the possible Social Work Interventions for LGBTQA.
 b) State Geriatric Care - Concept, Issues and Services.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
 a) Review the Programmes for Person with Disabilities.
 b) Write about Agencies working for Human Rights.
 c) Discuss NGOs working for Child Rights.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
 a) Describe Concept and issues of Children with Special Needs.
 b) Write the importance of Marriage Counselling.
 c) Give the light on indicators of Women Development.

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Ph.D. Course Work Examination: March/April – 2026
Social Work (Paper - 3)
Advanced Knowledge in Core Domain of Social Work-Medical and
Psychiatric Social Work (1062/ PHD-155)

Day & Date: Saturday, 02-05-2026
 Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. (Long Answer Question) 20**
 a) Explain the Need of medical social work to India in Current Scenario.
 b) Discuss the psychological effects on the individual patient of being enclosed in a psychiatric hospital.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
 a) Write the Meaning of communicable diseases and explain the Types of communicable diseases.
 b) Expound the role and functions of the Psychiatric Social Worker in the Rehabilitation of HIV/AIDS patients.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
 a) Discuss the role and functions of the Psychiatric Social Worker in promoting Community Mental Health.
 b) What are neurosis disorders?
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
 a) Trace the Historical Development of psychiatric social work in USA.
 b) Describe the Relationship of Psychiatric Social Work with other disciplines like clinical psychology, psychiatry, occupational therapy etc.
 c) Explain the Growth of psychiatric Social Work in India.
- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
 a) Mention any FOUR difficulties faced by Psychiatric Social Worker in the Field.
 b) Write the Meaning of non-communicable diseases and explain the Types of non-communicable diseases.
 c) Write details on Public health care programs in India.

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Ph.D. Course Work Examination: March/April – 2026
Commerce & Management (Paper - 3)
Advanced Knowledge in Core Domain of Commerce & Management
(Advanced Knowledge in Commerce & Management)
(1063/ PHD-118)

Day & Date: Saturday, 02-05-2026
Time: 11:00 AM To 02:00 PM

Max. Marks: 100

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

- Q.1 Answer Any One of the following. 20**
- What do you mean by Talent Management System? Explain functions and strategic benefits of Talent management System.
 - Define recent concept of ethics in HRM. Distinguish between Indian Conceptualization and Western Conceptualization.
- Q.2 Answer Any One of the following. (Long Answer Question) 20**
- Company Y acquires a machine for ₹20,00,000 on April 1, 2022.
 - The asset's useful life for accounting purposes is 10 years, with a nil residual value. The straight-line method is used.
 - For tax purposes, the machine is depreciated over 8 years, with a nil residual value, also using the straight-line method.
 - The tax rate is 30%.
 - On March 31, 2023, the machine is revalued to ₹28,80,000. No equivalent adjustment is made for tax purposes.**Required:** Calculate the deferred tax liability (DTL) and deferred tax expense for the years ending March 31, 2023, and March 31, 2024.
 - Explain key components and fundamental principles of AS-1 Preparation of Financial Statement.
- Q.3 Answer Any One of the following. (Long Answer Question) 20**
- Explain with example Common Protected Characteristics of workplace Discrimination and various types of Workplace Harassment.
 - What is International Financial Reporting Standards? Distinction between Ind AS and IFRS.
- Q.4 Answer Any Two of the following. (Short Answer Question) 20**
- Explain recent Core Components of Social Media Marketing. What are the popular platforms of social media marketing?
 - What is service marketing? Explain various Key Challenges involved in Services Marketing.
 - Explain Key Ethical Issues in HRM.

- Q.5 Answer Any Two of the following. (Short Answer Question) 20**
- a)** Challenges for implementation of Ind AS and IFRS in India.
 - b)** Explain in detail recent trends in modern banking.
 - c)** Define recent developments in capital market and banking sector.