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**M.Phil/Ph.D. Course Work Examination October-2021**

**Marathi (Paper – II)**

**मराठी साहित्यातील नवे प्रवाह**

Day & Date: Tuesday, 12-10-2021

Max. Marks: 100

Time: 11.00 AM to 02.00 PM

सूचना : 1) सर्व प्रश्न आवश्यक आहेत.

2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- प्र. 1 अ) '1920 ते 1945 या कालखंडातील साहित्य नवविचारांनी भारलेले होते' साधार 10  
परामर्श घ्या.
- ब) खालीलपैकी कोणतेही दोन लघुत्तरी प्रश्न सोडवा. 10
- 1) 'साहित्य प्रवाह' ही संकल्पना स्पष्ट करा.  
2) रविकिरण मंडळाच्या कवितेची वैशिष्ट्ये नोंदवा.  
3) 1960 ते 1985 या कालखंडातील समकालीन, आधुनिक का नाही? ते लिहा.
- प्र.2 अ) नवसाहित्य प्रवाह निर्मितीमागील प्रेरणा व प्रवृत्तींचा परामर्श घ्या. 10
- ब) खालीलपैकी कोणतेही दोन लघुत्तरी प्रश्न सोडवा. 10
- 1) कवी बा. सा. मर्ढेकर यांच्या नवकवितेची वैशिष्ट्ये कोणती?  
2) गंगाधर गाडगीळ यांच्या कथा लेखनाचे विशेष लिहा.  
3) 1945 नंतरच्या लेखनाचे वेगळेपण कोणते ते लिहा.
- प्र.3 अ) ग्रामीण साहित्याच्या प्रेरणा कोणत्या? सविस्तर लिहा. 10
- ब) खालीलपैकी कोणतेही दोन लघुत्तरी प्रश्न सोडवा. 10
- 1) 'खेड्यातील प्रश्नांचा पहिला अविष्कार म. फुले यांच्या लेखनातून झाला' स्पष्ट करा.  
2) ग्रामीणता आणि प्रादेशिकता या संकल्पना स्पष्ट करा.  
3) 'बोलीभाषेचा अभिव्यक्तिसाठी केलेला वापर ग्रामीण साहित्याचे वैशिष्ट्ये होय' विधानाची चर्चा करा.
- प्र.4 अ) दलित साहित्याचा प्रेरणाविचार सविस्तर लिहा. 10
- ब) खालीलपैकी कोणतेही दोन लघुत्तरी प्रश्न सोडवा. 10
- 1) दलित 'आत्मभान' म्हणजे काय? दलित साहित्यातून ते कसे प्रकट होते? सोदाहरण लिहा.  
2) दलित साहित्य आणि आंबेडकरी चळवळ यांच्यातील अनुबंध स्पष्ट करा.  
3) दलित साहित्यातून कोणत्या मानवी मूल्यांचा आग्रह व्यक्त होतो? ते लिहा.
- प्र.5 अ) भारतीय आणि पाश्चात्य स्त्रीवादाचा परिचय करवून द्या. 10
- ब) खालीलपैकी कोणतेही दोन लघुत्तरी प्रश्न सोडवा. 10
- 1) आदिवासी साहित्याची संकल्पना स्पष्ट करा.  
2) आदिवासी साहित्याचे विशेष नोंदवा.  
3) 'लिंगभेद' आणि 'लिंगभाव' या संकल्पना स्पष्ट करा.

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**Ph.D. Course Work Examination October-2021**  
**Physics (Paper – II)**  
**RECENT TRENDS IN PHYSICS**

Day & Date: Tuesday, 12-10-2021  
 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** a) Explain in detail working principle of X-ray diffraction. With the help of suitable diagram explain different components of X-ray diffractometer. **10**
- b) **Write Short Notes. (Any Two)** **10**
- 1) FESEM
  - 2) HRTEM
  - 3) UV Vis spectroscopy
- Q.2** a) Explain basic working principle of EDS and WDS. Explain the process of image formation using electron beam. How is it possible to improve the resolution of image using TEM? **10**
- b) **Write Short Notes. (Any Two)** **10**
- 1) JCPDS data card
  - 2) Lattice parameter determination for tetragonal and hexagonal system
  - 3)  $\theta$ - $\theta$  and  $\theta$ - $2\theta$  spectrometers
- Q.3** a) What is working principle of Atomic Force Microscopy? Explain in detail image formation process using AFM in contact and non contact mode. **10**
- b) **Write Short Notes. (Any Two)** **10**
- 1) Optical band gap
  - 2) Chemical shift in XPS
  - 3) X-ray diffractometer
- Q.4** a) What is the energy of electromagnetic radiation used to record the UV-Vis spectrum? Explain basic principle of UV visible spectroscopy with the help of suitable example. **10**
- b) **Write Short Notes. (Any Two)** **10**
- 1) Magnetic force microscopy
  - 2) Surface force and adhesion measurements
  - 3) UPS measurements
- Q.5** a) Explain the requirement of the material to be IR active. How to record the IR spectrum of a given material? Explain different components of IR spectrometer. **10**
- b) **Write Short Notes. (Any Two)** **10**
- 1) FTIR spectrometer
  - 2) Active modes of vibration in perovskite structure
  - 3) IR spectrum of diatomic molecule a harmonic oscillator

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**Ph.D. Course Work Examination October-2021**  
**Zoology (Paper – II)**  
**RECENT TRENDS IN ZOOLOGY (Old)**

Day & Date: Tuesday, 12-10-2021  
 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 and labeled diagram wherever necessary.

- Q.1** a) Describe pathogenic microbes of Viruses with suitable examples. **10**  
 b) **Write Short Notes. (Any Two)** **10**  
 1) Pathogenic protozoan *Trichomonas*  
 2) Pathogenic helminthes *Echinococcus*  
 3) Vector- host- pathogen interaction of Mites
- Q.2** a) Define Lipid. Add note on its classification with suitable example of each. **10**  
 b) **Write Short Notes. (Any Two)** **10**  
 1) Hematological techniques  
 2) Electrophoresis  
 3) Chromatography
- Q.3** a) Describe Immunological techniques. **10**  
 b) **Write Short Notes. (Any Two)** **10**  
 1) Salient features of Nucleic acids  
 2) Radioimmunoassay of hormones  
 3) Salient features of cell culture
- Q.4** a) Illustrate Green house effect. **10**  
 b) **Write Short Notes. (Any Two)** **10**  
 1) Acid rain  
 2) Ozone depletion  
 3) Bioremediation of contaminated soil
- Q.5** a) Describe Threats of Biodiversity. **10**  
 b) **Write Short Notes. (Any Two)** **10**  
 1) Cytological trends in classification  
 2) Taxonomic Keys  
 3) Cryopreservation of gametes

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**Ph.D. Course Work Examination October-2021**  
**Zoology (Paper – II)**  
**RECENT TRENDS IN ZOOLOGY (New)**

Day & Date: Tuesday, 12-10-2021  
 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 and labeled diagram wherever necessary.

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|------------|---|-----------|
| <b>Q.1</b> | a) Describe pathogenic protozoans with suitable examples. | <b>10</b> |
|            | b) <b>Write Short Notes. (Any Two)</b>                    | <b>10</b> |
|            | 1) Pathogenic helminth <i>Wuchereria</i>                  |           |
|            | 2) Pathogenic microbes Rabies                             |           |
|            | 3) Vector- host- pathogen interaction of Lice             |           |
| <b>Q.2</b> | a) Describe various Biochemical methods/techniques.       | <b>10</b> |
|            | b) <b>Write Short Notes. (Any Two)</b>                    | <b>10</b> |
|            | 1) Hematological techniques                               |           |
|            | 2) Classification of Carbohydrates                        |           |
|            | 3) Detection of Enzymes                                   |           |
| <b>Q.3</b> | a) Describe Nucleic acid biotechniques.                   | <b>10</b> |
|            | b) <b>Write Short Notes. (Any Two)</b>                    | <b>10</b> |
|            | 1) Elements of immunology                                 |           |
|            | 2) RIA of hormones  |           |
|            | 3) Cell culture techniques                                |           |
| <b>Q.4</b> | a) Illustrate Green house effects.                        | <b>10</b> |
|            | b) <b>Write Short Notes. (Any Two)</b>                    | <b>10</b> |
|            | 1) Acid rain  |           |
|            | 2) Bioremediation of waste land                           |           |
|            | 3) Diversity indices                                      |           |
| <b>Q.5</b> | a) Comment on Conservation strategies of Biodiversity.    | <b>10</b> |
|            | b) <b>Write Short Notes. (Any Two)</b>                    | <b>10</b> |
|            | 1) Morphological basis of taxonomy                        |           |
|            | 2) Wildlife biology                                       |           |
|            | 3) Taxonomic keys   |           |

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**Ph.D. Course Work Examination October-2021**  
**Geography (Paper – II)**  
**RECENT TRENDS IN GEOGRAPHY**

Day & Date: Tuesday, 12-10-2021  
 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** a) Explain geography as a scientific discipline. **10**  
 b) **Answer in short. (Any Two)** **10**  
 1) Ptolemy  
 2) Welfare approach in Geography  
 3) Scaling in geography
- Q.2** a) Describe the behavioral approach in geography and explain its limitations. **10**  
 b) **Answer in short. (Any Two)** **10**  
 1) Work of Arab geographers  
 2) Concept of regionalization  
 3) Geographical Laws
- Q.3** a) Define the types and significance of model in geography. **10**  
 b) **Answer in short. (Any Two)** **10**  
 1) Vidal De la Blache  
 2) Concept of human resource development  
 3) Geography and tourism development
- Q.4** a) Explain the concept of region in geography. **10**  
 b) **Answer in short. (Any Two)** **10**  
 1) Geography and Industrial Development  
 2) Concept of area  
 3) Theories in geography
- Q.5** a) Explain the application of geography in planning and development of health care. **10**  
 b) **Answer in short. (Any Two)** **10**  
 1) Idiographic approach in geography  
 2) Concept of space  
 3) Carl Ritter

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**Ph.D. Course Work Examination October-2021**  
**Economics (Paper – II)**  
**RECENT TRENDS IN INTERNATIONAL ECONOMICS (Old)**

Day & Date: Tuesday, 12-10-2021  
 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** a) Explain the effects of economic growth on trade, terms of trade, production and welfare? **10**
- b) **Answer the following questions. (Any Two)** **10**
- 1) Elaborate the concept of terms of trade with reference to developed countries.
  - 2) Write a short note on Multi National Companies.
  - 3) Explain the impact of globalization on technology transmission in India.
- Q.2** a) Discuss the Vernon's Product Cycle theory in detail. **10**
- b) **Answer the following questions. (Any Two)** **10**
- 1) Define the theory of volume of trade and demand pattern in brief.
  - 2) Explain in brief imitation gap theory.
  - 3) Write a note on the theory of unequal exchange.
- Q.3** a) Elaborate the difference between GATT and World Trade Organization. **10**
- b) **Answer the following questions. (Any Two)** **10**
- 1) Write a brief structure of WTO.
  - 2) Explain the various functions of World Trade Organization.
  - 3) Explain post WTO economic environment of the world.
- Q.4** a) Evaluate the India's Changing composition and direction of foreign Trade since 1991. **10**
- b) **Answer the following questions. (Any Two)** **10**
- 1) Explain in brief the impact of globalization on India's international trade.
  - 2) Explain the various export promotional measures undertaken by the Government of India.
  - 3) Write a short note on new economic policy of 1991.
- Q.5** a) Explain the trends of foreign direct investment since 1991 in India. **10**
- b) **Answer the following questions. (Any Two)** **10**
- 1) Explain the role of SEZ in export promotion in India.
  - 2) Define the concept of Human Capital Development.
  - 3) Explain the impact of FDI on infrastructural development in India.

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**Ph.D. Course Work Examination October-2021**  
**Economics (Paper – II)**  
**ADVANCED THEORIES IN ECONOMICS (New)**

Day & Date: Tuesday, 12-10-2021  
 Time: 11.00 AM to 02.00 PM

Max. Marks: 100

सूचना : 1) सर्व प्रश्न आवश्यक आहेत.

2) उजवीकडील अंक पुर्ण गुण दर्शवितात.

- |        |   |    |
|--------|---|----|
| प्र. 1 | अ) हिक्सच्या सुधारित मागणी सिद्धांताचे टीकात्मक परीक्षण करा.                            | 10 |
|        | ब) थोडक्यात उत्तरे द्या. (कोणतेही दोन)  | 10 |
|        | 1) समवृत्ती वक्र तंत्राचे उपयोग सांगा.  |    |
|        | 2) किंमत परिणामाचे वर्णन करा.   |    |
|        | 3) छेदक मागणी लवचिकतेची चर्चा करा.  |    |
| प्र.2  | अ) आयलर सिद्धांताचे टीकात्मक परीक्षण करा.   | 10 |
|        | ब) थोडक्यात उत्तरे द्या. (कोणतेही दोन)  | 10 |
|        | 1) उत्पादन शक्यता वक्रावर टिप्पणी करा.  |    |
|        | 2) कॉबडग्लस प्रतिमान स्पष्ट करा.  |    |
|        | 3) खर्च आणि खर्च वक्रांचे वर्णन करा.  |    |
| प्र.3  | अ) मक्तेदारी बाजारपेठेत वस्तू विभेद असताना उद्योगसंस्था आणि उद्योगाचा समतोल स्पष्ट करा. | 10 |
|        | ब) थोडक्यात उत्तरे द्या. (कोणतेही दोन)  | 10 |
|        | 1) संयुक्त अल्पधिकाराच्या कार्टेल प्रतिमानावर चर्चा करा.                                |    |
|        | 2) चेंबर्लीन प्रतिमान स्पष्ट करा.   |    |
|        | 3) बाकदार मागणी वक्राच्या अल्पाधिकार प्रतिमानावर टिप्पणी करा.                           |    |
| प्र.4  | अ) बौमोल महत्तम विक्री गृहीतकाचे मूल्यमापन करा.   | 10 |
|        | ब) थोडक्यात उत्तरे द्या. (कोणतेही दोन)  | 10 |
|        | 1) विल्यमसन प्रतिमानाचे वर्णन करा.  |    |
|        | 2) सियार्त आणि मार्च यांचे वर्तमान प्रतिमान स्पष्ट करा.                                 |    |
|        | 3) उद्योग संस्थेच्या ध्येयाची चर्चा करा.  |    |
| प्र.5  | अ) IS-LM प्रतिमानाचे वर्णन करा.   | 10 |
|        | ब) थोडक्यात उत्तरे द्या. (कोणतेही दोन)  | 10 |
|        | 1) हौल-हीच अहवाल स्पष्ट करा.  |    |
|        | 2) बेनच्या किंमत मर्यादा सिद्धांतातील सुधारणांचे वर्णन करा.                             |    |
|        | 3) व्याज संबंधातील केन्सचे विचार सांगा.   |    |

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**Ph.D. Course Work Examination October-2021**  
**Economics (Paper – II)**  
**ADVANCED THEORIES IN ECONOMICS (New)**

Day & Date: Tuesday, 12-10-2021  
 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** a) Critically examine the Hicks revised theory of demand. **10**  
 b) **Answer in shorts (Any Two)** **10**  
 1) Describe applications of indifference curve technique.  
 2) Elucidate the Price effect.  
 3) Discuss on Cross elasticity of demand.
- Q.2** a) Evaluate critically the Euler's theorem. **10**  
 b) **Answer in shorts (Any Two)** **10**  
 1) Comment on the Isoquant.  
 2) Explain the Cobb-Douglas production function.  
 3) Elucidate the Cost and Cost Curves.
- Q.3** a) Describe the equilibrium of the firm and the group with product Differentiation under monopolistic competition. **10**  
 b) **Answer in shorts (Any Two)** **10**  
 1) Discuss on Cartel model of collusive oligopoly.  
 2) Explain the Chamberlain model of non-collusive oligopoly.  
 3) Comment on kinked demand curve model of non-collusive oligopoly.
- Q.4** a) Appraise the Baumol's Sales Maximization Hypothesis. **10**  
 b) **Answer in shorts (Any Two)** **10**  
 1) Elucidate the Managerial discretion Model of Williamson.  
 2) Explain the Behavioral Model of Cyert and March.  
 3) Discuss the goals of a firm.
- Q.5** a) Elucidate the IS-LM Model. **10**  
 b) **Answer in shorts (Any Two)** **10**  
 1) Explain the Hall and Hitch report.  
 2) Describe the recent developments in Bain's limit pricing theory.  
 3) Discuss the Keynesian views on interest.



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**Ph.D. Course Work Examination October-2021  
Political Science (Paper – II)**

**RECENT TRENDS IN POLITICAL SCIENCE**

Day & Date: Tuesday, 12-10-2021

Max. Marks: 100

Time: 11.00 AM to 02.00 PM

सूचना : 1) सर्व प्रश्न आवश्यक आहेत.

2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- |        |    |   |    |
|--------|----|---|----|
| प्र. 1 | अ) | बहुसांस्कृतिकतावादाच्या मुख्य संकल्पना स्पष्ट करा.            | 10 |
|        | ब) | कोणतेही दोन लघुत्तरी प्रश्न सोडवा.                            | 10 |
|        |    | 1) समुदायवादाचे स्वरूप  |    |
|        |    | 2) लोकपाल   |    |
|        |    | 3) पर्यावरणशास्त्र परिभाषित करा                               |    |
| प्र.2  | अ) | जॉन रॉलचा न्याय सिद्धांत स्पष्ट करा.                          | 10 |
|        | ब) | कोणतेही दोन लघुत्तरी प्रश्न सोडवा.                            | 10 |
|        |    | 1) सार्वजनिक प्रशासनाची जबाबदारी                              |    |
|        |    | 2) विकासाची पर्यायी वंशावळ                                    |    |
|        |    | 3) लोकायुक्त  |    |
| प्र.3  | अ) | विकासावरील टीका लिहा.   | 10 |
|        | ब) | कोणतेही दोन लघुत्तरी प्रश्न सोडवा.                            | 10 |
|        |    | 1) बहुसांस्कृतिकतावादाचे प्रकार                               |    |
|        |    | 2) भ्रष्टाचाराची समस्या                                       |    |
|        |    | 3) पर्यावरणवादाच्या मुळ संकल्पना                              |    |
| प्र.4  | अ) | जागतिकीकरणाच्या युगात विकास प्रशासनापुढील आव्हाने स्पष्ट करा. | 10 |
|        | ब) | कोणतेही दोन लघुत्तरी प्रश्न सोडवा.                            | 10 |
|        |    | 1) पर्यावरणवाद परिभाषित करा.                                  |    |
|        |    | 2) पर्यावरणशास्त्राच्या मुख्य संकल्पना                        |    |
|        |    | 3) बहुसांस्कृतिकतावादाची प्रासंगिकता                          |    |
| प्र.5  | अ) | समुदायवादावरील टीका स्पष्ट करा.                               | 10 |
|        | ब) | कोणतेही दोन लघुत्तरी प्रश्न सोडवा.                            | 10 |
|        |    | 1) प्रशासकीय विकास  |    |
|        |    | 2) पर्यायी विकासाला मुख्य प्रवाहात आणणे                       |    |
|        |    | 3) समुदायवादाची प्रासंगिकता                                   |    |

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**Ph.D. Course Work Examination October-2021**  
**Political Science (Paper – II)**  
**RECENT TRENDS IN POLITICAL SCIENCE**

Day & Date: Tuesday, 12-10-2021  
 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.

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|------------|-----------|---|-----------|
| <b>Q.1</b> | <b>a)</b> | Explain the core ideas of Multiculturalism.   | <b>10</b> |
|            | <b>b)</b> | <b>Answer in shorts (Any Two)</b>   | <b>10</b> |
|            |           | 1) Nature of Communitarianism   |           |
|            |           | 2) Lokpal   |           |
|            |           | 3) Define Ecologism   |           |
| <b>Q.2</b> | <b>a)</b> | Explain the John Rowl's theory of Justice.  | <b>10</b> |
|            | <b>b)</b> | <b>Answer in shorts (Any Two)</b>   | <b>10</b> |
|            |           | 1) Accountability of Public Administration.   |           |
|            |           | 2) An alternative genealogy of Development.   |           |
|            |           | 3) Lokayukta  |           |
| <b>Q.3</b> | <b>a)</b> | Write the Critique on Development.  | <b>10</b> |
|            | <b>b)</b> | <b>Answer in shorts (Any Two)</b>   | <b>10</b> |
|            |           | 1) Types of Multiculturalism  |           |
|            |           | 2) Problem of Corruption  |           |
|            |           | 3) The core ideas of Environmentalism   |           |
| <b>Q.4</b> | <b>a)</b> | Explain the Challenges before Development Administration in the era of globalization. | <b>10</b> |
|            | <b>b)</b> | <b>Answer in shorts (Any Two)</b>   | <b>10</b> |
|            |           | 1) Define Environmentalism  |           |
|            |           | 2) The core ideas of Ecologism  |           |
|            |           | 3) The relevance of Multiculturalism  |           |
| <b>Q.5</b> | <b>a)</b> | Explain the Critic on Communitarianism.   | <b>10</b> |
|            | <b>b)</b> | <b>Answer in shorts (Any Two)</b>   | <b>10</b> |
|            |           | 1) Administrative Development   |           |
|            |           | 2) Mainstreaming Alternative Development  |           |
|            |           | 3) The relevance of Communitarianism  |           |

Seat No.	
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**Ph.D. Course Work Examination October-2021**

**Mechanical Engineering (Paper – II)**

**RECENT TRENDS IN MECHANICAL ENGINEERING FROM TECHNOLOGY MANAGEMENT PERSPECTIVE (Old)**

Day & Date: Tuesday, 12-10-2021

Max. Marks: 100

Time: 11.00 AM to 02.00 PM

**Instructions:** 1) All questions are compulsory.  
2) All questions carry equal marks.

- |            |    |   |           |
|------------|----|---|-----------|
| <b>Q.1</b> | a) | Explain the importance of technology management in present scenario.      | <b>10</b> |
|            | b) | <b>Write Short Notes (Any Two)</b>  | <b>10</b> |
|            |    | 1) Linkage between technology, development and competition                |           |
|            |    | 2) Concept of management of Technology                                    |           |
|            |    | 3) Classification of Technology   |           |
| <b>Q.2</b> | a) | Explain with suitable example the Mission Flow Diagram.                   | <b>10</b> |
|            | b) | <b>Write Short Notes (Any Two)</b>  | <b>10</b> |
|            |    | 1) Growth curves  |           |
|            |    | 2) Technology Monitoring  |           |
|            |    | 3) Morphological Analysis   |           |
| <b>Q.3</b> | a) | Explain Technology forecasting: techniques and application.               | <b>10</b> |
|            | b) | <b>Write Short Notes (Any Two)</b>  | <b>10</b> |
|            |    | 1) The scope of Innovation Management                                     |           |
|            |    | 2) Research and development management                                    |           |
|            |    | 3) Technology leadership and followership                                 |           |
| <b>Q.4</b> | a) | Explain project management in adoption.                                   | <b>10</b> |
|            | b) | <b>Write Short Notes (Any Two)</b>  | <b>10</b> |
|            |    | 1) Technology transfer process.   |           |
|            |    | 2) Technology Assessment and Environmental Impact Analysis                |           |
|            |    | 3) Qualities of successful technical entrepreneurs.                       |           |
| <b>Q.5</b> | a) | Explain factors responsible for the growth of technical entrepreneurship. | <b>10</b> |
|            | b) | <b>Write Short Notes (Any Two)</b>  | <b>10</b> |
|            |    | 1) Environmental Impact Analysis  |           |
|            |    | 2) Implementation of new technologies                                     |           |
|            |    | 3) Speed of Diffusion   |           |