5853

Ph.D. ENTRANCE EXAMINATION, OCTOBER 2013

Name of Candidate

Register Number

Answer Booklet Code

Signature of Candidate

Signature of Invigilator

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Time : 140 Minutes   Max. Marks : 160

Section – B & C

(This is to test the candidate's capability of defining concepts through short answers.)

Note :

1) Answer **any twelve** questions from Section **B** and **one** question from Section **C**.
2) In Section **B each** question carries **10** marks. Section **C** carries **40** marks.
3) In Section **B** an answer should not exceed **100** words. In Section **C** an answer should not exceed **500** words.
4) Candidates should **clearly** indicate the **Section, Question Number** and **Question Booklet code** in the answer paper.
5) The candidates are **permitted** to answer questions **only** from the subject that comes under the **faculty** in which he/she seeks registration as indicated in the **application** form.

FACULTY OF APPLIED SCIENCE

1. **Computer Science**
2. **Environmental Science**
3. **Computational Biology & Bioinformatics**

FACULTY OF APPLIED SCIENCE

1. Computer Science

Section – B

1. What is a *Thread*? Compare Kernel level and user level *Threads*.

2. Explain how Semaphore helps us to obtain mutual exclusion. What are the different types of semaphores ?

3. Give a brief description about public key and private key cryptography.

4. What is an interrupt ? Explain different types of interrupt.

5. Explain Direct Memory Access (DMA)

6. Explain different components of a queuing system.

7. What is BCNF ? Show how normalization removes redundancy with suitable examples.

8. Explain lock based concurrency control in DBMS.

9. Explain the purpose of Bootstrap loader in a computer system.

10. Distinguish between Encryption and Digital signature.

11. Explain Demand Paging.

12. Explain different protocols in Transport Layer.

13. What are the characteristics of Dynamic Programming ?

14. Explain any three page replacement algorithms.

15. Explain Booth multiplication algorithm.

16. Explain different class of complexity of algorithms.

Section – C

1. Give a detailed description of your proposed research work.

2. What is *DATAMINING*? Discuss the different *DATAMINING* tasks.

3. What is *Artificial Intelligence* ? Discuss any four applications of *Artificial Intelligence*.

2. Environmental Sciences

Section – B

1. Continental drift and its importance in the earth evolution.

2. Best practices in mining operation cite suitable examples.

3. Most advanced taxonomic classification and how it is different from earlier classifications ?

4. Photovoltaics – what is its importance ?

5. Biological indicators of air pollutants – biomonitoring by modeling.

6. Metamorphic and sedimentary rocks.

7. Petrochemical industry and pollution.

8. Intra-specific and inter-specific competition.

9. Population pollution – what is the maximum population density for healthy life ?

10. Chemistry of ozone layer and its importance in global warming – propose a method of mitigation.

11. Inductively Coupled Plasma Mass Emission Spectrophotometry and its application in environmental study with examples.

12. Concept of limiting factors and laws of limiting factors.

13. Green Balance Sheet (GBS) and what is its significance ?

14. MPN and PCR techniques what are applications ?

15. INSAT satellites and their sensors.

16. Major environmental movements in India.

Section – C

1. Human population growth and its impact on Kerala. What are the best practices to control population ?

2. What is land use planning for resource management sustainable development ?

3. Biogeochemical cycles and how this is connected with wastes generation ?

3. Computational Biology and Bioinformatics

Section – B

1. Explain in detail how BLOSUM matrix is different from PAM matrix.

2. What does E-value in BLAST indicate ? Name two parameters that determine the E-value.

3. Explain any one of the ab initio gene prediction algorithm.

4. Describe the uses of comparative genomics.

5. Write short notes on SNP databases.

6. Define multiple sequence alignment using Genetic algorithm.

7. Explain the steps involved in phylogenetic analysis.

8. What is the content of a pdb file and what are its limitations ?

9. Give examples of protein-protein interaction databases and describe their usefulness in protein-protein interactions.

10. Explain in detail the DNA sequence methodologies.

11. What is meant by the term 'Gene co-expression' ? How can microarrays be used to study co-expressed genes ?

12. What is the difference between ligand based and target based drug discovery ?

13. What are the anticipated impact of systems biology on medical research and practice ?

14. Write short note on the potential applications of synthetic biology.

15. What is RNA interference technology ? Briefly address its real world application.

16. What are non-coding RNA's ? What are the various types of functionally important ncRN's ?

Section – C

1. Write a program in JAVA or PERL or PYTHON to read the file Gi.txt(in FASTA format) and create complementary strand sequence.

2. Write a program in JAVA or PERL or PYTHON or in C to read the pdb file (4Q21.PDB) and extract all the coordinates of Cα atoms.

3. Define the problem statement and explain the objectives, methodology to be adopted and relevance of the topic in Computational Biology on which you wish to do research.

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