

**Subject: Advance Application Development****Instructions:**

1. All questions are **compulsory**.
  2. Mixing of sub questions is not allowed.
  3. Write in clear, legible, writing.
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Q1) Attempt any four: (20)

- A. Write note on Node.js.
- B. Explain Anatomy of Node.js HTTP Module?
- C. Write note on Event loop.
- D. Explain Routing in Node.js?
- E. Explain Mongo DB. Write features of Mongo DB.
- F. Write commands to create and update documents in Mongo DB.

Q2) Attempt any four: (20)

- A. Explain Express framework in detail.
- B. Write steps to create a Node.js Express Application?
- C. Write how to create template in Express.
- D. Write note on Express Middleware functions.
- E. Explain Architectural Constraint of REST API.
- F. Write note on Angular JS.

Q3) Attempt any four: (20)

- A. Explain flutter framework.
- B. Explain different testing methods used in flutter.
- C. Write note on data types supported by dart programming.
- D. Explain the object oriented concepts used in Dart.
- E. What is Widget? Explain different widgets supported by flutter.
- F. Write note on image widget.

Q4) Attempt any five: (15)

- A. Write about hot reload and hot restart in flutter.
- B. Write note on container widget.
- C. Explain package. JSON.
- D. Write note on Mongo DB compass
- E. Write note on HTTP methods used in REST API.
- F. Write note on operators used in dart programming.

Research Methodology

28.3.2024

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Q1) Attempt any four: (20)

- A) What is the motivation in research? Explain different types of research?
- B) What are the importance of formulating a research problem?
- C) How to identify a research problem and what are the components of research problem
- D) What is hypothesis and Explain different types of hypothesis
- E) What is the research objective? Why are research objectives important?
- F) What is the need of research design

Q2) Attempt any four: (20)

- A) Explain different methods to collect the primary data?
- B) Explain the flow diagram for hypothesis testing?
- C) Explain the different steps in sampling design?
- D) What are the types and examples of observation interviews?
- E) Explain the Two-sided hypothesis?
- F) Explain type I and type 2 errors?

Q3) Attempt any four: (20)

- A) What is a Scientific Paper? Explain different characteristics of scientific research?
- B) Explain Ethics in Scientific publishing?
- C) List and explain different types of reports?
- D) How to state acknowledgment and references?
- E) How to write the thesis, research, and outcome?
- F) List and explain different areas of Scientific Dishonesty?

Q4) Attempt any five: (15)

- A) Explain the roles of authors?
- B) Explain different methods to collect the Secondary data?
- C) Explain two tailed and one tailed test?
- D) What is the criteria of good research?
- E) How to prepare effective graphs?
- F) What are the delimitations of research problem?

## SYCS Semester IV - Theory Of Computation

Max Time: 2½ hrs

Max Marks: 75

Instructions:

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- 3) Write in clear, legible, writing.
- 4) Design/construct includes state-transition diagram and the transition table and its mathematical specification.

- Q1) Attempt any four: (20)
- A) Give the formal/mathematical specification of a DFA. Explain each term.
  - B) Design a DFA for accepting all strings in which every 00 is immediately followed by a 1.
  - C) For  $\Sigma = \{a, b\}$ , construct a DFA that accepts the sets consisting of all strings with no more than two a's.
  - D) Construct a Moore Machine to compute the number of substrings of the form *bab*, that occur in an arbitrary input string, over the alphabet  $\{a,b\}$  and output alphabet  $\{0,1\}$ .
  - E) Design a DFA for the language  $L = \{awa : w \in \{a, b\}^*\}$ .
  - F) Design a DFA for accepting strings only if its length is a multiple of 4.
- Q2) Attempt any four: (20)
- A) Construct a CFG to generate the set of all balanced parenthesis over the alphabet  $\Sigma = \{(,)\}$ .
  - B) Construct a grammar which generates all odd integers less than four digits.
  - C) Show that  $L = \{a^t \text{ where } t = i^2 \text{ and } i \geq 1\}$  is not regular.
  - D) Describe the following regular expression in English:  $00^*11^*22^*$ . Also give five strings from the above set.
  - E) Remove all the null productions and rewrite the production rules:  $S \rightarrow ABAC, A \rightarrow aA, A \rightarrow \epsilon, B \rightarrow bB, B \rightarrow \epsilon, C \rightarrow c$ . Show all the steps.
  - F) Remove all unit productions and rewrite the production rules:  $S \rightarrow XY, X \rightarrow a, Y \rightarrow Z|b, Z \rightarrow m, M \rightarrow N, N \rightarrow a$ . Show all the steps.
- Q3) Attempt any four: (20)
- A) Give the formal/mathematical specification of a Turing machine. Explain each term.
  - B) Explain the three components of a Turing machine with the help of a diagram.
  - C) Design a TM that accepts the language of all strings, over the alphabet  $\Sigma = \{a, b\}$ , whose second letter is *b*.
  - D) Explain the variants of the Turing machine.
  - E) State the Church-Turing thesis.
  - F) Design a TM that erases all non-blank symbols on the tape, over the alphabet  $\Sigma = \{a, b\}$ .
- Q4) Attempt any five: (15)
- A) Design an appropriate machine to add two binary numbers.
  - B) Give the Chomsky classification of Grammar/Language.
  - C) What are context-free grammar and language? Give examples.
  - D) Design a PDA for  $L = \{ww^R : w \in \{a, b\}^*\}$ .
  - E) Explain the halting problem.
  - F) Give a grammar for a valid identifier in Java programming language.



<COMPUTER NETWORK>Instructions:

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Q1) Attempt any four: (20)

- A. Draw and explain OSI model.
- B. Draw and explain twisted pair cable and fiber optic cable.
- C. Draw and explain circuit switched networks.
- D. Explain data rate limits.
- E. Draw and explain frequency hopping spread spectrum.
- F. Draw and explain frequency division multiplexing.

Q2) Attempt any four: (20)

- A. Explain protocol layering.
- B. Explain parity generator and checker circuit.
- C. Explain ICMP query messages.
- D. What is media access control? Explain the CSMA/CD method with a diagram.
- E. Draw and explain IPV4 packet format.
- F. Explain different types of satellite network.

Q3) Attempt any four: (20)

- A. What is unicast routing? explain link state routing algorithm.
- B. Explain TCP sliding window protocol.
- C. List and explain UDP applications.
- D. Write short note on FTP connection.
- E. What is domain? Explain types of domain in DNS.
- F. Explain different mode of operation available in telnet.

Q4) Attempt any five: (15)

- A. What is data communication? explain characteristics of data communication.
- B. Explain transmission impairment in detail.
- C. Explain SSH protocol.
- D. Explain session layer services.
- E. Explain CSMA/CD method.
- F. Explain DNS resolution process.

Software Engineering

Instructions:

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Q1) Attempt any four: (20)

- A) What is Spiral Model? What are its different phases.
- B) Explain prototype modelling and state its types.
- C) Explain Rational Unified Process. What are its different phases.
- D) Write a Short note on RAD Model.
- E) What is Time Boxing model.
- F) Describe Agile Software Development.

Q2) Attempt any four: (20)

- A) Explain the basic principles of project scheduling.
- B) What are Factors Influencing the Make/Buy Decision.
- C) What is software metrics? State its types and explain it.
- D) Explain the COCOMO Model in brief.
- E) Explain the importance of market research in the software engineering project.
- F) Explain the feasibility study in software development.

Q3) Attempt any four: (20)

- A) State the difference between quality assurance and quality control.
- B) Explain the different types of testing in software engineering.
- C) Explain RMMM plan.
- D) What are the characteristics of a good software? Explain in brief.
- E) State the difference between traditional and non - traditional water fall models.
- F) Write the importance of customer review in the development of the software.

Q4) Attempt any five: (15)

- A) Explain the requirement elicitation in software engineering
- B) What are the responsibilities of a project manager.
- C) What do you mean by Cohesion? State its types and explain it.
- D) Explain the capability maturity model in brief. What are the different levels in CMM.
- E) Describe different Methods for Identifying Risks.
- F) Write a note on incremental model in brief.

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IOT TechnologiesInstructions:

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Q1) Attempt any four: (20)

- A) Define and explain IoT.
- B) Explain IoT characteristics.
- C) Write a short note on IoT protocols.
- D) Write a short note on Low-power WANS (LPWANS).
- E) Write a short note on LWM2M (Lightweight M2M).
- F) Compare LPWANS and LWM2M.

Q2) Attempt any four: (20)

- A) What are the reasons for lack of IoT security?
- B) Write python program for controlling LED with switch.
- C) List features of UART.
- D) Compare SPI and I2C.
- E) How different sensors can be interfaced with IoT devices.
- F) What are the considerations while selecting sensor for particular application E.g: weather monitoring.

Q3) Attempt any four: (20)

- A) List the applications of IoT.
- B) Why would someone opt for Fog computing?
- C) List the communication protocols.
- D) Mention the methodologies for IoT application.
- E) Compare cloud computing and Fog computing.
- F) Define IoT levels.

Q4) Attempt any five: (15)

- A) Explain MQTT Protocol in Brief.
- B) Explain XMPP Protocol in Brief.
- C) Write in Brief About IOT History.
- D) Explain About Different Raspberry Model's.
- E) What is NodeRed.
- F) WSN Architecture and its different types.



**Android Application Development****Instructions:**

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**Q1) Attempt any four: (20)**

- A) Draw and Explain the Lifecycle of an Activity
- B) Explain any three different operations that can be performed on a String variable in Kotlin
- C) What are the rules for naming Kotlin variables?
- D) Explain the following Kotlin operators:-Arithmetic, Comparison
- E) Explain any three operations in relation to Kotlin arrays
- F) What are intents? What are its types? Explain each with suitable example

**Q2) Attempt any four: (20)**

- A) Explain the AutoCompleteTextView and how to create and use it
- B) Explain the Spinner and how to create and use it
- C) Explain the different types of Android Layouts
- D) How do you create and add elements to ListView? Explain
- E) How do you create styles for UI controls? Explain
- F) Explain the Popup menu in android and how to create and use them

**Q3) Attempt any four: (20)**

- A) Explain the lifecycle of a Started Service
- B) Explain the Android MediaPlayer API through an example
- C) How to create Animations in Android? Explain through an example
- D) Explain the process of stopping a service
- E) What are Broadcast Receivers? How do you create broadcast receivers? Explain through an example
- F) What are Services? What are its two types?

**Q4) Attempt any five: (15)**

- A) How do you write comments in a Kotlin program?
- B) Explain the following Kotlin If...Else Expression statements
- C) Explain the following Kotlin operators:-Logical
- D) Explain the CheckBox Views
- E) Names and explain in one sentence, the methods used AsyncTask in Android
- F) What are the three types of menus in Android? Name them

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