

**BITS ID:** .....

**Birla Institute of Technology & Science, Pilani**  
**AY2016-2017 Semester 2, Software Architectures (SS G653)**  
**Mid-Semester Examination, March 2017 (Closed Book)**

**Max Marks: 25M**

**Duration: 90 Minutes**

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**INSTRUCTIONS:**

- **ALL questions are compulsory. The paper has total Four (4) questions on Two (2) printed pages.**
  - **Answer all parts of a question together. Attempt questions in the same order as given in the question paper. Follow this instruction strictly.**
  - **DESPITE the CORRECTNESS of an answer, the QUALITY of the answer is an IMPORTANT EVALUATION criterion. Always JUSTIFY your answers. Vague and Overwritten answers will not be entertained.**
  - **Mention your assumptions with your answers as and when considered/assumed by you.**
  - **Write your BITS ID on the top corner of the paper.**
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1. **[1M\*7=7M]** Answer the following questions:
  - (a) Does achieving quality completely a function of an architectural design? Justify your answer with a supporting example.
  - (b) A peer-to-peer architecture employs late binding of the topology. Does it an architecturally significant requirement (ASR)? If yes, which quality attributes does this requirement inhibit?
  - (c) What is the difference between Architectural Structures and View? Give an example to justify your reasoning. Zero marks will be awarded without justification or suitable examples.
  - (d) There are different kinds of architectural structures and views such as Module structure, Component-and-Connector. Which architectural structure or view describes in detail how a module is coded? Justify your answer.
  - (e) Why do we use tactics when we can have patterns? Give two reasons and justify your answer.
  - (f) Name and describe the purpose of at least two main types of security tactics. Give at least two specific examples (just mention the names) of an architectural tactic for each type.
  - (g) Name and describe two main types of performance tactics. Give at least two specific examples (with their purpose) of an architectural tactic for each type.
2. **[2M]** Briefly explain how the four contexts Technical, Project life cycle, Business, and Professional affect/influence the Software Architecture.
3. **[2M]** What do you mean by System Architecture? How the System Architecture differs from Software Architecture? Discuss what it has in common with Software Architecture.

4. [14M] Consider the following information:

*With an objective to encourage regular customers, Foodking canteen management planned to develop a Java Based software system called FKC for semi-automation of the canteen. The constraint on the system is that it must be able to run on Windows 8.1. The management planned to give the project to a team of three students from BITS Software Architecture Course. For this, they asked the students to give expression of interests (EoI) and submit the possible architecture. The software has following information:*

*A customer needs to register initially in the software. The customer needs to supply his/her name, hostel/home address, and mobile number to the canteen clerk. The canteen clerk adds the information to the system through a well designed interface. Each registered customer is assigned a unique customer ID (CID) by the software system. Based on the generated CID, a clerk manually prepares a customer identity card after getting the manager's signature on it.*

*At present, the customer needs to present the card to the clerk each time when he/she wants to make any purchase. The clerk makes an entry of the sale-detail into the system manually. In this case, value of his/her purchase is credited against his/her CID in the system. But, it is planned that in the future that FoodKing management will deploy an Automatic Purchase Machine (APM) so that customers can himself/herself place their orders by scanning their CID cards to the APM. The APM software will be purchased from a Third Party vendor. Once the CID card is scanned and corresponding purchase is selected from APM display, APM will interact and update the sale-detail into the system automatically.*

*In order to increase the customer base, at the end of each year, the manager uses the system to generate a winner list showing surprise gift award to 50 customers who make the highest total purchase over the year. Also, the manager generates a winner list showing an INR1,000 BITS-COOP Voucher gift to the customers whose total purchase since he/she registered with the software exceeds INR 20,000.*

Based on the above information, answer the following questions:

- (a) [2M] Identify four major stakeholders in the given system. To avoid confusion, you *must* group similar stakeholders as one entity. Identity the role of each stakeholder.
- (b) [3M] Given the above mentioned requirements, give a rough design of the system. Name the components of the system, interaction among them, and the services offered by them. The diagram should be clear and information should be unambiguous.
- (c) [1M] Identify two functional requirements and two constraints on the proposed system. Justify your reasoning.
- (d) [1M] Identify two architectural significant requirements (ASR) and two non architectural significant requirements (Non-ASR) for the above system. Justify your answer.
- (e) [4M] Identify major quality attribute requirements for the above system. Justify your reasoning. Prioritize the identified quality attributes in accordance to the system requirements. Justify your reasoning for prioritizing the quality attributes. Explain at least two architectural tactics used to achieve each of the identified quality attributes.
- (f) [3M] What is the purpose of a utility tree? Generate and define how is a utility tree used in FKC evaluation?

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