



EXAMINATIONS – 2021

TRIMESTER 2

NWEN 304

Advanced Network Applications

Time Allowed: ONE HOUR

CLOSED BOOK

Permitted materials: Only silent non-programmable calculators or silent programmable calculators with their memories cleared are permitted in this examination.
No electronic dictionaries are allowed.

Instructions: Attempt ALL TWENTY ONE (21) questions:

There are THREE (3) sections:

- Section A - True or False [10 marks]
- Section B - Multiple Choice [20 marks]
- Section C - Short Answers [30 marks]

The examination consists of 60 marks in total.

SECTION A [10 marks] State True or False by circling the correct answer.

1. HTTP is a stateless protocol.
 - a. True
 - b. False

2. When cache contents are set with a private directive, it means that the contents cannot be stored in browser's cache.
 - a. True
 - b. False

3. In quorum consensus, strong consistency arises when the read sets do not overlap with the write sets.
 - a. True
 - b. False

4. Relational databases support horizontal scaling while NoSQL databases support vertical scaling.
 - a. True
 - b. False

5. I can get a cookie from a website that I have never visited.
 - a. True
 - b. False

SECTION B [20 marks] Multiple Choice Questions. Circle the correct answer(s).

6. How are the route parameters captured in a Node application?

- a. req.data
- b. app.locals
- c. req.params
- d. res.params

7. What will be the output of the following EJS code?

```
{  
  "name": "<strong>Smith</strong>"  
}  
<p>Welcome, <%=user %>.</p>
```

- a. Smith
- b. Smith
- c. **Smith**
- d. Run time error

8. Which of the following represents a record in NoSQL?

- a. Field
- b. Document
- c. Collection
- d. database

9. Which one of the following flags should we use to ensure that our cookies are only sent over HTTPS?

- a. HTTPOnly
- b. Secure
- c. SameSite
- d. HTTPSOnly

10. Which one of the following is not an example of XSS attack?

- a. Stored XSS
- b. DNS XSS
- c. Reflected XSS
- d. DOM based XSS

11. Select **ALL** valid statements with respect to Authorization code grant workflow.
 - a. Life time of a refresh token is more than the life time of an access token.
 - b. Resource server does not need to contact the authorization server for user verification.
 - c. A client secret is part of the access token request which is then used to verify the client application.
 - d. Authorization code grant can be used as-it-is without amendments for applications that run entirely in browser.
12. Which one of the following depicts the structure of a JWT?
 - a. Header.Payload.Signature
 - b. Payload.Header.Signature
 - c. Signature.Header.Payload
 - d. None of the above
13. Select **ALL** valid statements.
 - a. In causal consistency causally related writes must be seen by all devices in the same order.
 - b. Asynchronous leader-follower replication models compromise availability in favour of consistency.
 - c. A semi-synchronous leader-follower replication model avoids the issue of writes being lost when a leader fails.
 - d. An overlap between read and write sets in a Quorum consensus based replication model allows reads to be consistent with the updated writes in the write set.
14. Consider an application that involves more writes than reads. In such a scenario, which of the following will be a suitable configuration for Quorum consensus replication such that there is a good balance between availability and consistency?
 - a. $N = 3, R = 3, W = 1$
 - b. $N = 3, R = 2, W = 2$
 - c. $N = 3, R = 1, W = 1$
 - d. $N = 3, R = 1, W = 3$
15. Which of the following consistency model is suitable when a system needs to reflect a change immediately to all the replicas?
 - a. Eventual consistency
 - b. Strong consistency
 - c. Causal consistency
 - d. None of the above

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SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
Specify the question number for work that you do want marked.

SECTION C [30 marks] Short Answer Questions.

16. Explain the use of `CACHE-CONTROL:NO-CACHE` and `NO-STORE` HTTP headers. (4 marks)

17. Present the polynomial that serves as the shared secret in Shamir's polynomial algorithm for (3:5) secret sharing. Give reason for the choice of the polynomial. **(4 marks)**

18. Bob runs his bog at bobblog.com. As his blog became popular he decides to make some money and signs up with a third-party advertisement network. The advertisement provider gives him the following HTML code snippet (Snippet A), and tells him to add it to his page where he wants advertisements to be shown:
- ```
<script src="http://clcikads.com/ads.js?customer=bobblog"> </script>
```
- Describe one attack that is possible with snippet A that can be avoided by using the attribute http-only with cookies. Briefly explain your answer. **(4 marks)**




19. Explain the use of `ACCESS-CONTROL-ALLOW-CREDENTIAL` HTTP header in the context of cross-origin resource sharing (CORS). **(5 marks)**

20. What is the CAP theorem and why is this theorem important for developing NoSQL databases? **(5 marks)**

21. What is the authorization code grant type in OAuth? Briefly explain how this grant type enables delegated resource access in OAuth. **(8 marks)**

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