WEB DEVELOPMENT WITH NODE AND EXPRESS
(CSEN 4237)

Time Allotted : 2½ hrs   **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 4 (four)</u> from Group B to E, taking <u>one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Given the following classes and prototype relationships:
class Person {}
class Employee extends person {}
class Manager extends Employee {}
const sumit = new Manager();
What will be the value of line 1 and line 2 in the snippet below:
Object.getPrototypeOf(sumit) === Manager.prototype;   //   line 1
Object.getPrototypeOf(sumit) === Employee.prototype; //   line 2
(a) true, false   (b) true, true   (c) false, true   (d) false, false

(ii) What is Callback?
(a) The callback is a technique in which a method calls back the caller method
(b) The callback is an asynchronous equivalent for a function
(c) Both of the above
(d) None of the above.

(iii) What is the main usage of Node.js terminal (REPL)?
(a) To specify the preview of the Node.js application   (b) For testing Node.js/JavaScript expressions
(c) For executing browser's JavaScript expressions   (d) None of these.

(iv) Which function arguments are available to Express.js Route handlers?
(a) req - the request object   (b) res - the response object
(c) next   (d) all of these.

(v) In ExpressJS, the method app.all(path, callback [, callback ...]) can accept all HTTP methods
(a) True   (b) False   (c) Insufficient Data   (d) None of these

(vi) What is the output of following code snippet?
process.on('exit', code => {
    setTimeout(() => { console.log('I am exiting'); }, 0);
    console.log('Exited with status code:', code);
});
console.log('Execution Completed');
(a) Execution Completed   (b) Execution Completed   Exited with status code: 0
(c) I am exiting   (d) I am exiting   Execution Completed

(vii) What is the main difference between the inheritance of class based language and javascript?
(a) In JavaScript (prototypical) inheritance is achieved by traversing prototype chains, as opposed to class blueprints that define rigid and non-dynamic inheritance relationships
(b) No difference between these two types of inheritances
(c) Classical inheritance is more flexible then prototypical inheritance
(d) Javascript does not support inheritance so comparison cannot arise.

(viii) What is the output printed in the console?
var noBr = 4;
function tree() {
  noBr = 8;
  branch();
}
function branch() { var noBr = 6; }
tree();
console.log(noBr);
(a) 4   (b) 6   (c) 8   (d) None of the above

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(ix) What are the packages mostly used in Node environment for generating and sending clean, responsive HTML e-mails?
(a) nodemailer and doc   (b) nodemailer and htmlgen
(c) nodemailer and mailgen   (d) All of these.

(x) What is the value of x after executing following code snippet?
```
let x = 6;
x = (x++ , x = subTwo(x), x *= 2, x -= 5, x += 10);
function subTwo(num) {  return num - 2;  }
```
(a) 25   (b) 6   (c) 27   (d) 15.

Fill in the blanks with the correct word

(xi) If the current middleware function doesn't return any response or call the next(), the request will be left _____.

(xii) Simple or complex functionality organized in a single or multiple JavaScript files which can be reused throughout your Node.js application is called ___.

(xiii) _____method is used to compare the placement of two nodes in the DOM hierarchy (document).

(xiv) _____ operators help us to check abstract equality and equality without doing type conversion.

(xv) _____ removes/replaces characters in the data that might potentially be used to send malicious content to the server.

Group - B

2. (a) What are the advantages of using promises instead of callbacks?   *[(CO2)(Understand/LOCQ)]*
   (b) What is async/await and explain how does it work with an example?   *[(CO12)(Remember/LOCQ)]*
   (c) What is the use of 'extends' keyword in Javascript? Explain with an example. What is the purpose of the module.exports and require()? Explain with an example.   *[(CO4)(Analyse /IOCQ)]*
   3 + 3 + (3 + 3) = 12

3. (a) Compare What are the three ways of making objects in JavaScript? Give example of each.   *[(CO2)(Remember/LOCQ)]*
   (b) What are the three ways of writing asynchronous program in JavaScript? Say you want to access movies from a web site and display the movie list in a console application. Write the code snippet in each way. You can use request object or Axios (a promise-based HTTP client) for this purpose.   *[(CO2)(Analyse/IOCQ)]*
   (c) What are different types of module available in Node.js? Describe each briefly. What is the function of core modules namely module and require?   *[(CO2)(Remember/LOCQ)]*
   3 + 6 + 3 = 12

Group - C

4. (a) What is the purpose of the process module in NodeJs? Why importing of process module is not necessary while using its constructs? Write the names of four events exposed by process object. Write a code snippet to display a message "Process ends ${msg}" where msg parameter value is "successfully" sent when process exited.   *[(CO3)(Understand/LOCQ)]*
   (b) Write code snippet using process object to ask two questions "What is your Institute Name?" and "Like your Institute?" to user and display the response when process exit. Response should be `Thank you for your answers. Your responses are ${name} and ${like} `, where name and like are answers of the questions.   *[(CO3)(Analyse/IOCQ)]*
   (c) Explain the difference between Event and Callback with suitable example.
   Write a code snippet and explain how custom event is raised and handled in NodeJs.   *[(CO3)(Analyse/IOCQ)]*
   4 + 4 + 4 = 12

5. (a) Mention few features of Express.js.   *[(CO3)(Understand/LOCQ)]*
   (b) Write a code snippet for creating web server using http module of Node.js and showing response MAKAUT/cse against request url localhost: 3000/MAKAUT/cse.   *[(CO3)(Understand/LOCQ)]*
   (c) What is the purpose of process module in Node JS? Why the process object is always available to Node.js application without using require()?   *[(CO3)(Apply/IOCQ)]*
   4 + 4 + (2 + 2) = 12

Group - D

6. (a) What is an EventEmitter in Node.js?   *[(CO3)(Understand/LOCQ)]*
   (b) Write a short code snippet to explain the features of EventEmitter.   *[(CO3)(Understand/LOCQ)]*
   (c) You have to create an ActivityGr table in MySQL database name ActivityDB. Assume that admin credential for MySQL is user: "root", password: "hit" and host:"localhost". Create code snippets in Node to perform following functions:
   - Create database named ActivityDB
   - Create ActivityGr table in the above database with the fields grid INT(2), grDesc VARCHAR(200), post INT(5) and maxpoint INT(4).
   - Show all record stored in the table
   - Write the command to execute above code snippets in node environment assuming that snippets are stored in separate .js file.   *[(CO6)(Understand/IOCQ)]*
   2 + 2 + (2 + 2 + 2 + 2) = 12

7. (a) What is Validation and sanitization? Why do you need server-side validation? *[(CO4)(Understand/LOCQ)]*

(b) What is express-validator and write down its features? Explain the syntax and function of check() method of express-validator. *[(CO4)(Understand /LOCQ)]*

(c) Say you are posting a form in an express application which contains your name, email and password. Write a code snippet to validate these three fields as per following validation criteria using express-validator.
- Name field must contain only alpha and length minimum 5 character
- Must be valid email
- Password must be minimum 8 character and maximum 15 character

For each validation you have to show appropriate custom error message. *[(CO5)(Analyse/LOCQ)]*

(2 + 2) + (1.5 + 1.5) + 5 = 12

Group - E

8. (a) What is Multipart Data? Briefly describe the features of Multer module. *[(CO5,CO6)(Remember/LOCQ)]*

(b) Write a simple express application for uploading a single file using Multer package. You must allow only file with extension jpeg or jpg or png and file size not exceeding 1 MB. Uploaded file needs to be saved in a folder in your local drive with a suitable unique file name and extension. *[(CO5,CO6)(Apply/IOCQ)]*

(2 + 2) + 8 = 12

9. Say you have created a faculty table in MySql database InstDB. Write a REST API for performing following CRUD operations using MVC pattern. You need to use following specifications:
- Name and data type of different fields of Table faculty : id – int, facName – varchar(60), deptCode – char(3), qualification – varchar(10)
- Database Server - HOST: "localhost", USER: "root", PASSWORD: "hit4536", DB: "InstDB"
- Three CRUD operations to be developed : Create a new faculty , Find faculty by id, Update faculty information by id
- Develop model controller and router code in separate js files.
- Use Express router object.
- Create a database connection using configuration in db.js file.
- Create a server.js for starting the web server. *[(CO6)(Apply/HOCQ)]*

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	45.83	41.67	12.5

Course Outcome (CO):

After the completion of the course students will be able to
CSEN4237.1. Understand the JavaScript and technical concepts behind Node JS 2
CSEN4237.2. Structure a Node application in modules and use npm and manage node packages
CSEN4237.3. Understand and use the various core module
CSEN4237.4. Build a Web Server in Node and understand how it really works
CSEN4237.5. Build a web application and API more easily using Express
CSEN4237.6. Develop commonly used functionalities in web application using various third-party packages available in Node environment and REST APT to access database like MySql MongoDB.

LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.