

(3 Hours)

Total Marks: 80

- N.B: (1) Question No. 1 is compulsory.  
 (2) Attempt any three questions out of the remaining five questions.  
 (3) Make suitable assumptions wherever necessary.

- 
- Q.1. A. What is three-address code? Generate three-address code for – 5
- ```

while (a<b) do
  if(c<d) then
    x:=y+z
  else
    x:=y-z
  
```
- B. Compare between Compiler and Interpreter. 5  
 C. Explain absolute loader. State its advantages and disadvantages. 5  
 D. Discuss with example 'forward reference'. 5
- Q.2. A. Construct SLR parser for the following grammar and parse the input 10  
 "( )":  $S \rightarrow (S)S \mid \epsilon$ .  
 B. State and explain with examples, different types of statements used in 10  
 assemblers with respect to system programming.
- Q.3. A. Explain the concept of basic blocks and flow graph with example the 10  
 three-address code.  
 B. Explain with help of a flowchart, the first pass of two-pass macro 10  
 processor.
- Q.4. A. Explain the phases of a compiler. Discuss the action taken in various 10  
 phases to compile the statement:  
 $a=b*c+10$ , where, a, b, c are of type real.  
 B. Write short note on: 10  
 (i) Syntax-directed Translation, (ii) Macro facilities
- Q.5. A. What is code optimization? Explain with example, the following code 10  
 optimization techniques:  
 (i) Common sub-expression elimination (ii) Code motion  
 (iii) Dead code elimination (iv) Constant propagation  
 B. Explain Direct Linking Loader in suitable example. 10
- Q.6. A. Test whether following grammar is LL(1) or not. If it is LL(1), construct 10  
 parsing table for the same:  
 $S \rightarrow 1AB \mid \epsilon$   
 $A \rightarrow 1AC \mid 0C$   
 $B \rightarrow 0S$   
 $C \rightarrow 1$   
 B. Draw and explain the flowchart of Pass-I of two pass assembler with 10  
 suitable example.
-

Correction in 1T00736 - T.E.(Computer Engineering)(SEM-VI)(Choice Base Credit Grading System) (R-20-21) (C Scheme) / 89281 - System Programming & Compiler Construction

Q.P. Code: 10027651

Q.2. A) given grammar is:  $S \rightarrow (S)S \mid \epsilon$ .

correction in the grammar is:  $S \rightarrow (S)S \mid \epsilon$

(do not consider '!')

Q.6. A) In the given grammar

$S \rightarrow 1AB \mid \epsilon$

$A \rightarrow 1AC \mid 0C$

$B \rightarrow 0S$

$C \rightarrow 1$

consider the symbols - S,A,B,C, epsilon ( $\epsilon$ ), zero (0) and 1 (one).

B-203

AS  
08/05/23

(A.H.Jestup)

A-202

Chairman A.M. 08/05/23

**Duration: 3hrs**

**[Max Marks: 80]**

- N.B. : (1) Question No 1 is Compulsory.  
(2) Attempt any three questions out of the remaining five.  
(3) All questions carry equal marks.  
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
- a Explain the relationship between Security Services and Mechanisms in detail.
  - b Explain ECB and CBC modes of block cipher.
  - c Define non-repudiation and authentication. Show with example how it can be achieved.
  - d Explain challenge response-based authentication tokens.
  - e Explain buffer overflow attack.
- 2 a Elaborate the steps of key generation using the RSA algorithm. In RSA system the public key (E, N) of user A is defined as (7,187). Calculate  $\Phi(N)$  and private key 'D'. What is the cipher text for M=10 using the public key. [10]
- b Discuss DES with reference to following points [10]
- 1. Block size and key size
  - 2. Need of expansion permutation
  - 3. Role of S-box
  - 4. Weak keys and semi weak keys
  - 5. Possible attacks on DES
- 3 a What goals are served using a message digest? Explain using MD5. [10]
- b What is DDOS attack? Explain how is it launched. [10]
- 4 a Why are digital certificates and signatures required? What is the role of digital signature in digital certificates? Explain any one digital signature algorithm. [10]
- b How does PGP achieve confidentiality and authentication in emails? [10]
- 5 a State the rules for finding Euler's phi function. Calculate [10]
- a.  $\phi(11)$
  - b.  $\phi(49)$
  - c.  $\phi(240)$
- b Explain Kerberos. Why is it called as SSO? [10]
- 6 a Enlist the various functions of the different protocols of SSL. Explain the phases of handshake protocol. [10]
- b How is security achieved in Transport and Tunnel modes of IPSEC? Explain the role of AH and ESP. [10]

Duration: 3hrs

[Max Marks:80]

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 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.

- 1 Attempt **any FOUR** [20]
- a Explain concept of frequency reuse with clustering. 5
- b Explain in short wireless LAN security threats. 5
- c What is spread spectrum? 5
- d Describe use of Cellular IP. 5
- e Explain in short voice over LTE. 5
- a Explain in short different algorithm used for authentication and privacy in GSM. [10]
- b What is the use of different interfaces used in global system for mobile communication (GSM) with diagram? [10]
- a Explain hidden station and exposed station problem with solution in WLAN. [10]
- b How is packet delivery achieved to and from mobile node? [10]
- 4 a Explain snooping TCP and mobile TCP with their merits and demerits. [10]
- b Explain the process of registration in Mobile IP. [10]
- a Explain protocol architecture of IEEE 802.11 with diagram. [10]
- b How IP mobility is achieved in wireless network. [10]
- 6 a Explain different components used in LTE architecture with diagram. [10]
- b Which components are new in GPRS as compared to GSM? What is there purpose? [10]

Duration: 3 Hours

[Total Marks: 80]

**Instructions :**

- 1] Question No.1 is compulsory.
- 2] Answer any three from the remaining five questions.
- 3] Assume suitable data whenever required with proper justification.
- 4] Answers to questions should be grouped and written together.
- 5] Figures to the right indicate full marks.

**Attempt any four of the following. All sub-questions carry equal marks**

20

- (a) Write short notes on vibrometer. Also sketch related frequency response curve.
- (b) A thin circular disk of mass 2.5 Kg and radius 200 mm is suspended at a point on the circumference. Calculate mass-moment-of-inertia about the pivot axis.
- (c) Describe static and dynamic balancing of multi rotor system in details
- (d) Explain seismometer with neat system's diagram. Write formula related to the said system. Also sketch frequency response curve for the same.
- (e) A system has a mass 5 kg, and a spring of stiffness 1 KN/m. Calculate undamped time period.
- (f) Explain Critical speed of single rotor damped system.

- (a) What is the equivalent stiffness of the system of Fig: 1 using the displacement of the block as the generalized coordinate 10

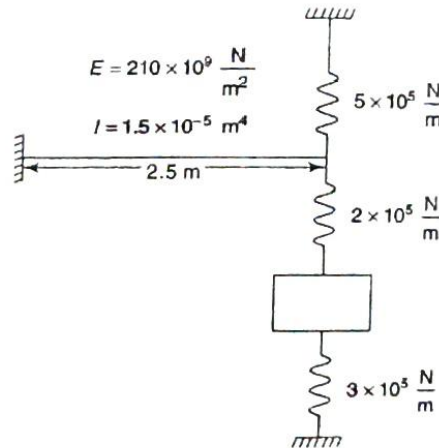


Fig.1

- (b) Use Lagrange's equation to derive the differential equations governing the motion of the system of fig. 2 using  $x_1$ ,  $x_2$  and  $x_3$  as the generalized coordinates. Also write the equations in matrix form. 10

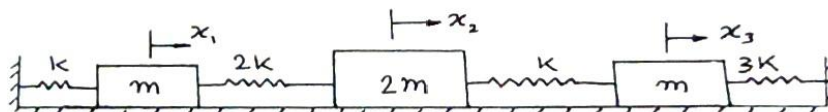


Fig. 2

- (a) A spring mass damper system, having an undamped natural frequency of 100 Hz and a damping constant of 25 NS/m, is used as an accelerometer to measure the vibration of a machine operating at a speed of 3000 rpm. If the actual acceleration is  $10 \text{ m/s}^2$  and the recorded acceleration is  $9 \text{ m/s}^2$ , find the mass and the spring constant of an accelerometer. 10

- (b) A machine of mass 500 Kg is acted upon by an external force of 2000 N at a frequency of 1500 r/min. To reduce the effect of vibration, an isolator of rubber having a static deflection of 2 mm under machine load and an estimated damping factor  $\xi = 0.2$  are used. Determine:
- The force transmitted to the foundation.
  - The amplitude of vibration of the machine.

- Q.4 (a) Find one of the natural frequencies of the vibrations of the system shown in fig. 3 for the frequency range 15-20 r/s. Take  $K_1 = K_7 = 0$ ,  $K_2 = K_3 = K_4 = K_5 = K_6 = 100$  N/m and values of all masses = 1Kg.



Fig.3

- (b) Explain the balancing of static and dynamic balancing of multi rotor system.  
 (c) How do you find the response of a viscously damped system under rotating unbalanced?

- Q.5 (a) 30 N at 20cm, 20 N at 40cm, 10 N at 60cm from fixed end are the loading on a cantilever. The deflection under 10 N due to all loads is 02mm. Find the natural frequency of oscillation of the system using Dunkerly's and Rayleigh's methods. The deflection at section i due to unit load at section j is given by,

$$U_{ij} = \frac{s_j^2}{\text{constant}} (3S_j - S_i) \quad \text{for } S_i \geq S_j$$

$U_{ij} = U_{ji}$ , 'S' is the distance from fixed end

- (b) Define whirling speed. Derive the equation for the critical speed of a light shaft with a single disc without damping.

- Q.6 (a) 1000 kg machine is mounted on four identical spring of total spring constant "K" and having negligible damping. The machine is subjected to a harmonic external force of amplitude  $F_0 = 500$ N and frequency 180 rpm. Determine the amplitude of motion of the machine and maximum force transmitted to foundation because of unbalanced force when  $K = 1.96 \times 10^6$  N/m.

- (b) A four cylinder engine has cranks arranged symmetrically along the shaft as shown figure 4. The distance between the outer cranks A and D is 5.4 m and that between the inner cranks B and C is 2.4 m the mass of the reciprocating parts belonging to each of the outer cylinder is tones and the belonging to each of the inner cylinder is m tones.

If the primary and secondary forces are to be balanced and also the primary couples, determine the crank angle positions and the mass of the reciprocating parts (m) corresponding to the inner cylinders.

Find also the maximum value of the unbalanced secondary couple, if the stroke is 1 meter, the connecting rod length 2 meters and speed of the engines 110 rpm.

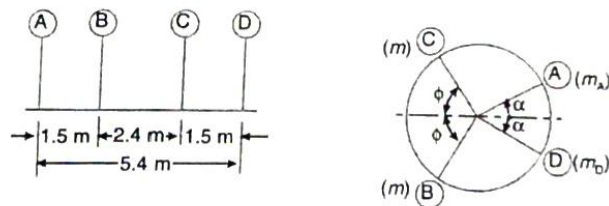


Fig.4

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Duration: 3hrs

[Max Marks:80]

- N.B. : (1) Question No 1 is Compulsory.  
 (2) Attempt any three questions out of the remaining five.  
 (3) All questions carry equal marks.  
 (4) Assume suitable data, if required and state it clearly.

- |   |                                                                                                              |      |
|---|--------------------------------------------------------------------------------------------------------------|------|
| 1 | Attempt <b>any FOUR</b>                                                                                      | [20] |
| a | Explain concept of frequency reuse with clustering.                                                          | 5    |
| b | Explain in short wireless LAN security threats.                                                              | 5    |
| c | What is spread spectrum?                                                                                     | 5    |
| d | Describe use of Cellular IP.                                                                                 | 5    |
| e | Explain in short voice over LTE.                                                                             | 5    |
| 2 | a Explain in short different algorithm used for authentication and privacy in GSM.                           | [10] |
|   | b What is the use of different interfaces used in global system for mobile communication (GSM) with diagram? | [10] |
| 3 | a Explain hidden station and exposed station problem with solution in WLAN.                                  | [10] |
|   | b How is packet delivery achieved to and from mobile node?                                                   | [10] |
| 4 | a Explain snooping TCP and mobile TCP with their merits and demerits.                                        | [10] |
|   | b Explain the process of registration in Mobile IP.                                                          | [10] |
| 5 | a Explain protocol architecture of IEEE 802.11 with diagram.                                                 | [10] |
|   | b How IP mobility is achieved in wireless network.                                                           | [10] |
| 6 | a Explain different components used in LTE architecture with diagram.                                        | [10] |
|   | b Which components are new in GPRS as compared to GSM? What is there purpose?                                | [10] |

Time: 3 Hours

Marks: 80

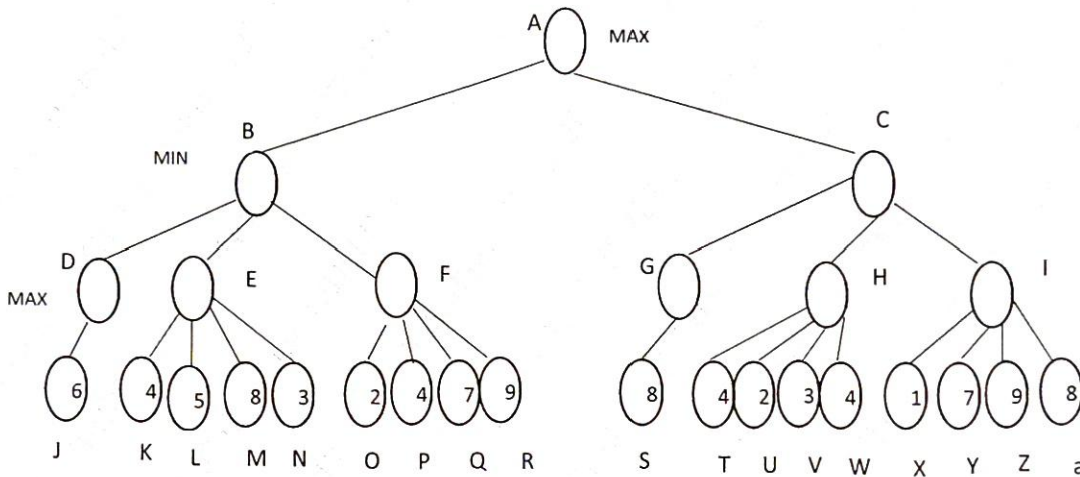
- 1) Q.1 is compulsory
- 2) Attempt any **three** from remaining **five** questions

Q1) Solve any four of the following:

- a) Describe different categories of AI [5]
- b) Describe the characteristics of a medical diagnosis system using the PEAS properties [5]
- c) Explain Goal based Agent with a block diagram [5]
- d) Compare and contrast propositional logic and first order logic [5]
- e) What do you mean by hill climbing. Explain. [5]

Q2)

- a) Perform  $\alpha$  -  $\beta$  pruning on the following graph, clearly indicating the  $\alpha$  and  $\beta$  cuts and the final value of root node. [10]



- b) What do you understand by informed and uninformed search methods? Explain in detail with example. [10]

Q3)

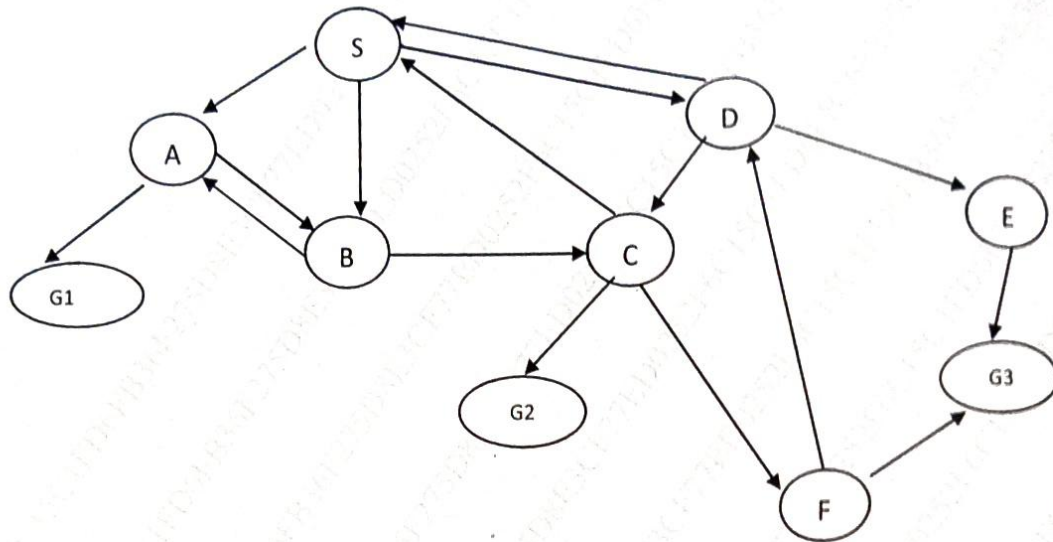
- a) Consider the following statements: [10]
  - a) All people who are earning are happy
  - b) All happy people smile
  - c) Someone is earning
 Perform the following tasks:
  - i) Represent above statements in FOL
  - ii) Convert each to CNF
  - iii) Prove that someone is smiling using resolution technique. Draw the resolution tree

- b) What do you understand by forward chaining and backward chaining. Explain in detail [10]



Q.4

a) For the given graph, the table below indicates the path costs and the heuristic values. S is the start node and G1, G2 and G3 are the goal nodes. Perform A\* search to find the shortest distance path from S to any of the goal nodes. [10]



| Edge | Cost      | Edge | Cost      | Edge | Cost      |
|------|-----------|------|-----------|------|-----------|
| SA   | 5         | BA   | 2         | DS   | 1         |
| SB   | 9         | BC   | 1         | DC   | 2         |
| SD   | 6         | CS   | 6         | DE   | 2         |
| AB   | 3         | CG2  | 5         | EG3  | 7         |
| AG1  | 9         | CF   | 7         | FD   | 2         |
|      |           |      |           | FG3  | 8         |
|      |           |      |           |      |           |
| Node | Heuristic | Node | Heuristic | Node | Heuristic |
| S    | 5         | D    | 6         | G1   | 0         |
| A    | 7         | E    | 5         | G2   | 0         |
| B    | 3         | F    | 6         | G3   | 0         |
| C    | 4         |      |           |      |           |

b) What is planning in AI? Discuss partial order planning and hierarchical planning in detail [10]

Q 5)

- a) Explain the concept of genetic programming [10]
- b) What is formulation of a problem. Formulate the Wumpus world problem in terms of following components: initial state, actions, successor function, goal test, path cost. [10]

Q.6 Write short notes on : [20]

- a) Applications of AI
- b) Simulated annealing

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Time: 3 hours

Max. Marks: 80

**Instructions:**

- 1) Solve any FOUR questions.
- 2) All question carries equal marks.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable additional data, if necessary and clearly state it.

- Q.1 a) Discuss IOTWF Standardized Architecture. (5 M)  
b) Explain Raspberry Pi with diagram. (5 M)  
c) Describe Zigbee protocol stack using IEEE 802.15.4. (10 M)
- Q.2 a) What are gateways and backhaul sub layers? (5 M)  
b) Briefly explain Adapting SCADA for IP. (5 M)  
c) What do you mean by SoC? Also explain its applications. (10 M)
- Q.3 a) Describe various health & lifestyle domain specific IOT. (5 M)  
b) Explain the different pin/parts of Arduino Uno board. (5 M)  
c) Describe data vs. network analytics for an IoT network. (10 M)
- Q.4 a) Write short notes on BLE. (5 M)  
b) Differentiate between Sensors and actuators with neat diagram. (5 M)  
c) What is IoT? Explain IoT blocks in detail. List out the different IOT Challenges. (10 M)
- Q.5 a) Explain IOT Application layer with a neat diagram. (5 M)  
b) Discuss the concept of Edge computing. (5 M)  
c) Explain MQTT. Compare - COAP and MQTT. (10 M)
- Q.6 a) Describe Architecture of Wireless Sensor Network. (5 M)  
b) Explain different Energy related IOTs Domain with example. (5 M)  
c) What are IOT software platform? Explain in short with an example. (10 M)

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