Test Booklet No. _____

This booklet consists of 150 questions and ___ pages.

RGUPET/2025/1004/1

RGUPET 2025
Common Entrance Test, 2025
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE AND ENGINEERING

Full Marks: 150 **Time: 3 Hours**

Roll No. | | | | | | | | |

Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

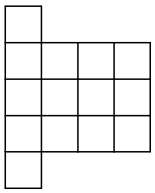
General Instructions:

PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 150 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall before completion of Examination.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.
8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy.

1	The "Mission Sudarshan Chakra", recently launched by the Prime Minister of India, primarily relates to				development of a multilayered air and missile defence system
	a) a national renewable energy mission	b) a national digital currency mission	c) development of a multilayered air and missile defence system	d) a national mission to modernise Indian Railways	(c)
2	"Pushpak"- a national mission being implemented by the Indian Institute of Technology, Bombay is related to the development of				Drone technology
	a) Helicopters	b) Dairy technology	c) Drone technology	d) Artificial intelligence	c)
3	North East India's first underwater tunnel project, announced in 2024, is proposed to connect				Numaligarh and Gohpur
	a) Dibrugarh and Dhemaji	b) Jorhat and Majuli	c) Numaligarh and Gohpur	d) Guwahati and North Guwahati	c)
4	Which of the following statements are correct? A. Canada hosted the 51st G7 summit in 2025. B. Four players were honoured with the Khel Ratna Award 2025. C. Sweden was ranked first in Global Innovation Index 2024. D. Operation Sindoor was Launched by India to attack terrorist bases in Pakistan on 7th May 2025.				(a)
	a) A, B and D	b) A,B and C	c) Only A	d) All of the above	A, B and D
5	Which of the followings are correct? A. Lip Butan has been appointed as the new CEO of Intel in March 2025 B. Shri C P Radhakrishnan has been appointed as the Vice President of India C. India's rank in the Human Development Index 2025 released by UNDP is 99 D. India has become the 2nd largest road network in the World.				(d)
	a) A and B only	b) A, B and C only	c) A, C and D only	d) A, B, D only	A, B, D only
6	Which of the following sentences is false? A. Palk Strait joins India and Sri Lanka B. The Radcliffe Line is between India and Bangladesh C. The MacMohan Line separates India and China D. The Durand Line is between Iran and Afghanistan.				
	a) A, B	b) B, C	c) C, D	d) B, D	(d)

7	Assertion (A): Eclipses do not occur on all full moon and new moon days. Reason (R): The moon revolves round the earth in an elliptical orbit.				A and R are true but R doesnot explain A
	a) A and R are true and R correctly explains A.	b) A and R are true but R does not explain A.	c) A is true R is false	d) R is true but A is false	(b)
8	Right to equality is a-				Fundamental right
	a) fundamental right	b) social right	c) cultural right	d) legal right	(a)
9	The author of the book "Midnight's Children" is-				Salman Rushdie
	a) Shakespeare	b) Leo Tolostoy	c) Salman Rushdie	d) R K Narayan	(c)
10	Match the organizations with their headquarters: A. UNESCO — 1. New York B. WHO — 2. Paris C. UNICEF — 3. Geneva D. IMF — 4. Washington D.C.				
	a) A–3, B–2, C–4, D–1	b) A–2, B–3, C–1, D–4	c) A–2, B–4, C–3, D–1	d) A–1, B–3, C–2, D–4	(b)
11	He said, "Happy new year!" The correct indirect speech of the above is-				He wished me a happy new year.
	a) He said the new year was happy.	b) He wished me a happy new year.	c) He said to me that happy new year.	d) I was wished a happy new year.	(b)
12	Identify the correct sentence(s) from the following. A. One of my friends is a doctor. B. I don't know nothing about her. C. It is a two-hour journey. D. We will be definitely there at the yesterday's programme.				
	a) A, B	b) B, C	c) A, C	d) C, D	(c)
13	"She drank the _____ milk that was there in the flask." The appropriate quantifier to fill in the blank is-				little
	a) all	b) little	c) sour	d) few	(b)
14	"a/ great /and/ reality/their/ theory/in/there/ disparity/is" The correct reordered meaningful sentence with the above jumbled words/phrases is- P. There is a great theory and their reality in disparity. Q. There is a great disparity in their theory and reality. R. Their great disparity is in a theory and reality there.				There is a great disparity in their theory and reality.

<table>
<tr><td></td><td colspan="4">S. Their great theory is a reality and in disparity there.</td><td></td></tr>
<tr><td></td><td>a) P</td><td>b) Q</td><td>c) R</td><td>d) S</td><td>(b)</td></tr>
<tr><td>15</td><td colspan="4">The correct match of synonyms and antonyms is:
<table><tr><td>A. Futile</td><td>i. Help</td></tr><tr><td>B. Generic</td><td>ii. Effective</td></tr><tr><td>C. Hinder</td><td>iii. Individual</td></tr><tr><td>D. Inception</td><td>iv. Termination</td></tr></table></td><td>A-ii, B-iii, C-i, D-iv</td></tr>
<tr><td></td><td>a) A-i, B-ii, C-iii, D-iv</td><td>b) A-iii, B-ii, C-iv, D-iii</td><td>c) A-iv, B-iii, C-i, D-ii</td><td>d) A-ii, B-iii, C-i, D-iv</td><td>(d)</td></tr>
<tr><td>16</td><td colspan="4">The total number of squares in the following figure is:
  </td><td>22</td></tr>
<tr><td></td><td>a) 24</td><td>b) 20</td><td>c) 22</td><td>d) 18</td><td>(c)</td></tr>
<tr><td>17</td><td colspan="4">Fill in the blank in the following pattern.
ELFY GLHX ILJW -------- MLNU</td><td>KLLV</td></tr>
<tr><td></td><td>a) KLLV</td><td>b) KLMX</td><td>c) JLLV</td><td>d) JLMX</td><td>a)</td></tr>
<tr><td>18</td><td colspan="4">Raghav introduces Vineet as the only son of the only brother of his father’s wife. How Raghav and Vineet are related?</td><td>cousin</td></tr>
<tr><td></td><td>a) brother</td><td>b) cousin</td><td>c) uncle</td><td>d) son-in-law</td><td>(b)</td></tr>
<tr><td>19</td><td colspan="4">Which two numbers should be interchanged to make the given equation mathematically correct?
$3 \times 6 + 72 \div 8 - 24 = 12$</td><td>6, 8</td></tr>
<tr><td></td><td>a) 6, 8</td><td>b) 6, 24</td><td>c) 3, 8</td><td>d) None</td><td>(a)</td></tr>
<tr><td>20</td><td colspan="4">If BANKER is coded as CAOKFR, then how would LAWYER be coded?</td><td>MAXYFR</td></tr>
<tr><td></td><td>a) LBWZES</td><td>b) LBWYFR</td><td>c) MAXYFR</td><td>d) MAXZES</td><td>c)</td></tr>
<tr><td>21</td><td colspan="4">Same error occurs at the same size in every measurement, and such errors can only be eliminated either by thinking through the sources of problems and removing them. This type of error is termed as:</td><td></td></tr>
<tr><td></td><td>a) Random errors</td><td>b) Systematic errors</td><td>c) Cascading errors</td><td>d) Perpetual errors</td><td>b</td></tr>
</table>

<table>
<tr><td>22</td><td colspan="4">Hypothesis-driven research begins with a hypothesis. A hypothesis is a statement about the world that can be true or false, and whose truth is being tested.</td><td></td></tr>
<tr><td></td><td>a) A valid hypothesis is based on ‘that exists’</td><td>b) A hypothesis is a positive conclusion</td><td>c) A hypothesis can never be tested</td><td>d) A valid hypothesis must be falsifiable</td><td>d</td></tr>
<tr><td>23</td><td colspan="4">Which of the following statements that could be considered as valid scientific hypotheses?

A. Eating two ounces of olive oil a day decreases the odds of contracting heart disease.
B. What is the best fertilizer to use to get large and tasty tomatoes?
C. Macs are better than PCs.
D. Briar’s Aspirin cures headaches faster than RCS Aspirin.</td><td>Answer</td></tr>
<tr><td></td><td>a) A, B</td><td>b) A, B, C</td><td>c) A, D</td><td>d) B, C</td><td>c</td></tr>
<tr><td>24</td><td colspan="4">Relate the ‘function or relationship’ (A) and ‘comment’ (B) and select the appropriate answer

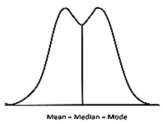
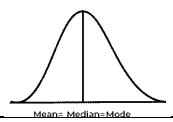
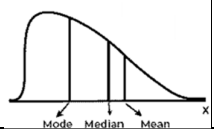
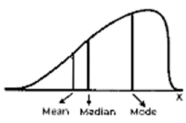
A: Find how the speed of sound in air at fixed pressure depends upon air temperature.

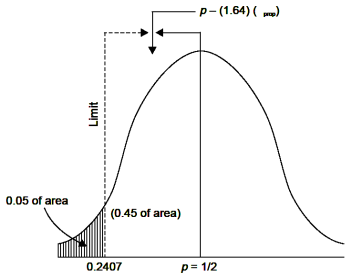
B: The control variable is temperature, and the response variable is sound speed.</td><td>Answer</td></tr>
<tr><td></td><td>a) Functional relationship is correct and the comment is true for the relationship</td><td>b) Functional relationship is incorrect but the comment is true for the relationship</td><td>c) Functional relationship is correct but the comment is false for the relationship</td><td>d) Neither the functional relationship is correct nor the comment is true</td><td>a</td></tr>
<tr><td>25</td><td colspan="4">Relate ‘sampling design’ and its ‘method’<table><tr><td>Sampling Design</td><td>Method</td></tr><tr><td>A. Deliberate</td><td>i. Sample collected as information received and survey progresses</td></tr><tr><td>B. Simple random</td><td>ii. sample drawn from a heterogeneous group</td></tr><tr><td>C. Stratified</td><td>iii purposive selection of particular units</td></tr><tr><td>D. Sequential</td><td>iv. very item in the population has an equal chance of inclusion</td></tr></table></td><td>Answer</td></tr>
<tr><td></td><td>a) A-iii, B-iv, C-ii, D-i</td><td>b) A-ii, B-iv, C-iii, D-i</td><td>c) A-i, B-iii, C-ii, D-iv</td><td>d) A-iii, B-ii, C-iv, D-i</td><td>a</td></tr>
<tr><td>26</td><td colspan="4">Number of observations in a normal distribution is 1000. How many observations will be there between $\mu+1\sigma$ and $\mu-1\sigma$</td><td>Answer</td></tr>
<tr><td></td><td>a) 500</td><td>b) 680</td><td>c) 720</td><td>d) 950</td><td>b</td></tr>
</table>

<table>
<tr><td>27</td><td colspan="4">Which of the following are reasons for citing a paper?

A. use its ideas, definitions, terms in a Research
B. provides upcoming facts regarding undergoing Research Question.
C. to adopt part/full methodology it adopted for a certain task.
D. to refer to data also used in Current Research.</td><td>Answer</td></tr>
<tr><td></td><td>a) A, B, C</td><td>b) B, C, D</td><td>c) A, C, D</td><td>d) A, B, D</td><td>c</td></tr>
<tr><td>28</td><td colspan="4">Scholars who wish to meet publication expectations mostly resort to a variety of techniques to increase their output and crank up their citation ranking, which are not considered ethical. Identify these techniques:

A. Gift authorship
B. Extensive experiments
C. Salami Slicing
D. Extensive referencing</td><td>Answer</td></tr>
<tr><td></td><td>a)A, B, C</td><td>b) A, B, D</td><td>c) B, C, D</td><td>d) A, C, D</td><td>d</td></tr>
<tr><td>29</td><td colspan="4">Match the references (APA 7 style):

<table><tr><td>A. Journal Article</td><td>i. Edwards, A. A., Steacy, L. M., Siegelman, N., Rigobon, V. M., Kearns, D. M., Rueckl, J. G., & Compton, D. L. (2022). Unpacking the unique relationship between set for variability and word reading development: Examining word- and child-level predictors of performance. Journal of Educational Psychology, 114(6), 1242–1256. https://doi.org/10.1037/edu0000696</td></tr><tr><td>B. Authored Book</td><td>ii. Levenson, H., Jinich, S., Vaz, A., & Rousmaniere, T. (2025). Deliberate practice in emotionally focused couple therapy. American Psychological Association. https://doi.org/10.1037/0000436-000</td></tr><tr><td>C. Webpage</td><td>iii. Zeleke, W. A., Hughes, T. L., & Drozda, N. (2020). Home–school collaboration to promote mind–body health. In C. Maykel & M. A. Bray (Eds.), Promoting mind–body health in schools: Interventions for mental health professionals (pp. 11–26). American Psychological Association. https://doi.org/10.1037/0000157-002</td></tr><tr><td>D. Edited Book Chapter</td><td>iv. Taras, Z. (2024, May 30). Situational irony can be funny, tragic or even terrifying. howstuffworks. https://entertainment.howstuffworks.com/arts/literature/situational-irony.htm</td></tr></table></td><td>Answer</td></tr>
<tr><td></td><td>a) A-i, B-ii, C-iv, D-iii</td><td>b) A-ii, B-iii, C-iv, D-i</td><td>c) A-iii, B-ii, C-i, D-iv</td><td>d) A-i, B-ii, C-iii, D-iv</td><td>a</td></tr>
<tr><td>30</td><td colspan="4">Which one of the following refers to positive skewness?</td><td></td></tr>
<tr><td></td><td>a)
 
</td><td>b)
 
</td><td>c)
 
</td><td>d)
 
</td><td>c</td></tr>
</table>

31	How much is the degree of freedom for the following data table? $S.\ No.$ | X_i | $Hypothesised\ mean\ m_{H_0} = 578\ kg.$ | $D_i = (X_i - \mu_{H_0})$ | D_i^2 5 | 572 | 578 | −6 | 36 6 | 578 | 578 | 0 | 0 7 | 570 | 578 | −8 | 64 8 | 572 | 578 | −6 | 36 9 | 596 | 578 | 18 | 324 10 | 544 | 578 | −34 | 1156 $n = 10$ | | | $\sum D_i = -60$ | $\sum D_i^2 = 1816$				Answer
	a) 8	b) 9	c) 10	d) 18	b
32	Find out the Null hypothesis for the given table $S.\ No.$ | X_i | $Hypothesised\ mean\ m_{H_0} = 578\ kg.$ | $D_i = (X_i - \mu_{H_0})$ | D_i^2 5 | 572 | 578 | −6 | 36 6 | 578 | 578 | 0 | 0 7 | 570 | 578 | −8 | 64 8 | 572 | 578 | −6 | 36 9 | 596 | 578 | 18 | 324 10 | 544 | 578 | −34 | 1156 $n = 10$ | | | $\sum D_i = -60$ | $\sum D_i^2 = 1816$				Answer
	a) $\mu_{H0} = 578$kg.	b) $\mu_{H0} \neq 578$kg.	c) $\mu_{H0} = -578$kg.	d) $\mu_{H0} = \pm 578$kg.	a
33	What will be sum of the deviations of observations from the regression line?				Answer
	a) -∞	b) 0	c) +∞	d) undefined	b
34	Derive from the following diagram  Assertion: In this normal distribution 5 percent of the sample are rejected. Justification: It shows a two tailed hypothesis test model at 90 percent confidence level				Answer
	a) Assertion is true and justification explains the Assertion	b) Assertion is false but justification explains the Assertion	c) Assertion is true and justification is true but does not explain the Assertion	d) Assertion is true and justification for the Assertion is incorrect	d
35	Match into pairs for the Statistical method with appropriate details mentioned: Statistical method | Details A. Correlation | i. Order 2, 3, 4, ……. B. Polynomial regression | ii. More than two population on same characteristics C. ANOVA | iii. Test of homogeneity D. Chi square | iv. Requires only two variables				Answer

	a) A-i, B-ii, C-iii, D-iv	b) A-iv, B-i, C-ii, D-iii	c) A-iv, B-ii, C-i, D-iii	d) A-iii, B-i, C-ii, D-iv	b
36	Match the following and give the correct answer: A. Nature of Interaction holding atom — i Kinetics B. Rate of Chemical Reaction — ii Bond C. Increase the rate of reaction — iii Lipid D. hydrocarbon chain insoluble in water — iv catalyst				Answer
	a) A(i), B(ii), C(iii), D(iv)	b) A(ii), B(i), C(iv), D(iii)	c) A(iii), B(ii), C(i), D(iv)	d) A(ii), B(iii), C(i), D(iv)	(b)
37	In a simple harmonic motion, the velocity of a particle is maximum at:				Answer
	a) Mean position	b) Extreme position	c) Halfway between mean and extreme	d) At all positions	(a)
38	In a double-slit experiment, if the distance between slits is doubled, what happens to the fringe spacing on the screen?				Answer
	a) Fringe spacing halves	a) Fringe spacing doubles	c)Fringe spacing remains the same	d)Fringe spacing quadruples	(a)
39	A block slides down a frictionless inclined plane. Which of the following statements is true?				Answer
	a) Mechanical energy is not conserved	b) Potential energy decreases, kinetic energy increases	c) Kinetic energy decreases	d)Acceleration is zero	(b)
40	Which of the following is true for a photon in a vacuum?				Answer
	a) It has mass but no energy	b) It has energy but no rest mass	c) It has rest mass and energy	d) It can be accelerated by a force	(b)
41	Which of the following is diamagnetic?				Answer
	a) CO_2	b) O_2	c) NO	d) O_2^-	(a)
42	Match the following ligands with their denticity: A. NH_3 — i. Quadridentate B. EDTA — ii. Monodentate C. Oxalate — iii. Hexadentate D. Porphyrin — iv. Bidentate				Answer
	a) A-ii, B-iii, C-iv, D-i	b) A-ii, B-iii, C-i, D-iv	c) A-iv, B-iii, C-ii, D-i.	d) A-ii, B-i, C-iv, D-iii	(a)

43	In which of the following compounds is the metal-metal bonding present**?**				Answer
	a) NaCl	b) ZnO	c) Al_2O_3	d) Cr_2Cl_6	(d)
44	A solution contains 0.1 mol of a non-volatile solute in 1 L of water at 298 K. Calculate the osmotic pressure:				Answer
	a) 2.44 atm	b) 1.33 atm	c) 0.22 atm	d) 0.11 atm	(a)
45	According to Henry's law, the solubility of a gas in a liquid is:				Answer
	a) Independent of pressure.	b) Directly proportional to pressure.	c) Inversely proportional to pressure.	d) Exponential with pressure.	(b)
46	If $f(x) = \begin{cases} \{\lvert x-2\rvert)/(x-2)\}, & x \neq 0 \\ 0, & otherwise \end{cases}$				Answer
	a) -1	b) 1	c) 0	d) does not exist	d
47	If $y = x^5 - 5x^4 + 5x^3 - 1$, then the value of $\frac{d^6y}{dx^6}$ is				Answer
	a) $120x - 120$	b) 120	c) 0	d) cannot be evaluated.	c
48	Which of the following is/are not true for a function f defined on closed interval $[a, b]$ to satisfy Rolle's theorem? A. f is continuous on closed interval$[a, b]$. B. f is differentiable on the open interval (a, b) C. $f(a) = f(b)$ D. $f(k) = 0$ for at least one $k \in [a, b]$.				Answer
	a) A and B	b) only D	c) B and C	d) Only C	b
49	A group which satisfies commutatively property is known a				
	a) Abelian group	b) Quotient group	c) Coset group	d) Normal group	a
50	Let M^T denotes transpose matrix of M and I is identity matrix. Match the following: A. M is idempotent — i. $M = M^T$ B. M is symmetric — ii. $M = -M^T$ C. M is skew-symmetric — iii. $M^2 = I$ D. M is involution — iv. $M^2 = M$				Answer
	a) A-iv, B-i, C-iii, D-ii	b) A-i, B-iv, C-ii, D-iii	c) A-iv, B-i, C-ii, D-iii	d) A-iv, B-ii, C-i, D-iii	c
51	A) In public key cryptography, one key is kept secret while the other is shared publicly. B) Public key cryptography is computationally less intensive than symmetric key cryptography.				A is True but B is False
	a) A is True but B is False	b) A is False but B is True	c) Both A and B are True	d) Both A and B are False	(a)

<table>
<tr><td>52</td><td colspan="4">A) Digital signatures are created using symmetric encryption.
B) A digital signature ensures both message integrity and sender authenticity.</td><td>A is False but B is True</td></tr>
<tr><td></td><td>a) A is True but B is False</td><td>b) A is False but B is True</td><td>c) Both A and B are True</td><td>d) Both A and B are False</td><td>(b)</td></tr>
<tr><td>53</td><td colspan="4">A) Phishing is a type of social engineering attack.
B) Firewalls can completely prevent all types of cyberattacks.</td><td>A is True but B is False</td></tr>
<tr><td></td><td>a) A is True but B is False</td><td>b) A is False but B is True</td><td>c) Both A and B are True</td><td>d) Both A and B are False</td><td>(a)</td></tr>
<tr><td>54</td><td colspan="4">A) In symmetric key cryptography, the encryption and decryption keys are the same.
B) Symmetric key cryptography is generally faster than public key cryptography.</td><td>Both A and B are True</td></tr>
<tr><td></td><td>a) A is True but B is False</td><td>b) A is False but B is True</td><td>c) Both A and B are True</td><td>d) Both A and B are False</td><td>(c)</td></tr>
<tr><td>55</td><td colspan="4">A) Kerberos is a network authentication protocol based on symmetric key cryptography.
B) Biometric authentication is considered something the user knows.</td><td>A is True but B is False</td></tr>
<tr><td></td><td>a) A is True but B is False</td><td>b) A is False but B is True</td><td>c) Both A and B are True</td><td>d) Both A and B are False</td><td>(a)</td></tr>
<tr><td>56</td><td colspan="4">Match Communication Modes with Examples
<table><tr><td>A. Simplex</td><td>i Telephone</td></tr><tr><td>B. Half Duplex</td><td>ii Walkie-talkie</td></tr><tr><td>C. Full Duplex</td><td>iii Keyboard-CPU</td></tr><tr><td>D Serial Link</td><td>iv Bit by bit transfer</td></tr></table></td><td>A-(iii), B-(ii), C-(i), D-(iv)</td></tr>
<tr><td></td><td>a) A-(i), B-(ii), C-(iii), D-(iv)</td><td>b) A-(ii), B-(iii), C-(i), D-(iv)</td><td>c) A-(iii), B-(ii), C-(i), D-(iv)</td><td>d) A-(iii), B-(ii), C-(i), D-(iv)</td><td>(c)</td></tr>
<tr><td>57</td><td colspan="4">Match Performance Terms with Definitions
<table><tr><td>A Bandwidth</td><td>i Actual data transfer rate</td></tr><tr><td>B Throughput</td><td>ii Range of available frequency</td></tr><tr><td>C Latency</td><td>iii Delay in transmission</td></tr><tr><td>D Jitter</td><td>iv Variation in packet delay</td></tr></table></td><td>A-(ii), B-(i), C-(iii), D-(iv)</td></tr>
<tr><td></td><td>a) A-(i), B-(ii), C-(iii), D-(iv)</td><td>b) A-(ii), B-(iii), C-(i), D-(iv)</td><td>c) A-(iv), B-(i), C-(iii), D-(ii)</td><td>d) A-(ii), B-(i), C-(iii), D-(iv)</td><td>(d)</td></tr>
</table>

58	Match Signal Types with Characteristics A Analog – i Discrete in nature B Digital – ii Continuous waveform C Binary – iii 0 and 1 only D Composite – iv Combination of sine waves				A-(ii), B-(i), C-(iii), D-(iv)
	a) A-(i), B-(ii), C-(iii), D-(iv)	b) A-(ii), B-(i), C-(iii), D-(iv)	c) A-(iv), B-(i), C-(iii), D-(ii)	d) A-(iv), B-(ii), C-(iii), D-(i)	(b)
59	Match Transmission Types with Properties A. Analog Transmission – i. Continuous signal transmission B. Digital Transmission – ii. Sending bits as voltages C. Baseband – iii. Single channel, digital data D. Broadband – iv. Multiple channels using modulation				A-(i), B-(ii), C-(iii), D-(iv)
	a) A-(i), B-(ii), C-(iii), D-(iv)	b) A-(i), B-(ii), C-(iv), D-(iii)	c) A-(iv), B-(iii), C-(i), D-(ii)	d) A-(iv), B-(iii), C-(ii), D-(i)	(a)
60	Match Transmission Media with Uses A. Twisted pair – i. Telephone lines B. Coaxial Cable – ii. Cable TV distribution C. Optical Fiber – iii. Short range remote D. Infrared – iv. High-speed backbone				A-(i), B-(ii), C-(iv), D-(iii)
	a) A-(i), B-(ii), C-(iii), D-(iv)	b) A-(i), B-(iii), C-(ii), D-(iv)	c) A-(i), B-(ii), C-(iv), D-(iii)	d) A-(iv), B-(ii), C-(iii), D-(i)	(c)
61	Match Error Detection Methods with Mechanism A. Parity check – i. Adds 1 bit to detect error B. CRC – ii. Uses polynomial division C. Checksum – iii. Detects & correct errors D. Hamming code – iv. Adds segments of message				A-(i), B-(ii), C-(iv), D-(iii)
	a) A-(i), B-(ii), C-(iii), D-(iv)	b) A-(i), B-(iii), C-(ii), D-(iv)	c) A-(iv), B-(ii), C-(iii), D-(i)	d) A-(i), B-(ii), C-(iv), D-(iii)	(d)

<table>
<tr><td>62</td><td colspan="4">Match Transmission Errors with Causes
<table><tr><td>A. Attenuation</td><td>i. loss of signal strength</td></tr><tr><td>B. Distortion</td><td>ii. Unwanted signal</td></tr><tr><td>C. Noise</td><td>iii. Delay differences in components</td></tr><tr><td>D. Crosstalk</td><td>iv. Interference from nearby channel</td></tr></table></td><td>A-(i), B-(iii), C-(ii), D-(iv)</td></tr>
<tr><td></td><td>a) A-(i), B-(ii), C-(iii), D-(iv)</td><td>b) A-(ii), B-(i), C-(iii), D-(iv)</td><td>c) A-(iv), B-(ii), C-(iii), D-(i)</td><td>d) A-(i), B-(iii), C-(ii), D-(iv)</td><td>(d)</td></tr>
<tr><td>63</td><td colspan="4">Match Modulation with Application
<table><tr><td>A. AM</td><td>i. High quality audio</td></tr><tr><td>B. FM</td><td>ii. Radio broadcasting</td></tr><tr><td>C. PM</td><td>iii. Special digital systems</td></tr><tr><td>D. QAM</td><td>iv. DSL, Wi-Fi</td></tr></table></td><td>A-(ii), B-(i), C-(iii), D-(iv)</td></tr>
<tr><td></td><td>a) A-(i), B-(ii), C-(iii), D-(iv)</td><td>b) A-(i), B-(ii), C-(iv), D-(iii)</td><td>c) A-(iv), B-(ii), C-(iii), D-(i)</td><td>d) A-(ii), B-(i), C-(iii), D-(iv)</td><td>(d)</td></tr>
<tr><td>64</td><td colspan="4">Type Questions here for assertion and justification
<table><tr><td>A. IEEE 802.3</td><td>i. Bluetooth</td></tr><tr><td>B. IEEE 802.11</td><td>ii. Ethernet</td></tr><tr><td>C. IEEE 802.15</td><td>iii. Wireless LAN</td></tr><tr><td>D. IEEE 802.16</td><td>iv. WiMAX</td></tr></table></td><td>A-(ii), B-(iii), C-(i), D-(iv)</td></tr>
<tr><td></td><td>a) A-(i), B-(ii), C-(iii), D-(iv)</td><td>b) A-(ii), B-(iii), C-(i), D-(iv)</td><td>c) A-(iv), B-(ii), C-(iii), D-(i)</td><td>d) A-(iv), B-(iii), C-(ii), D-(i)</td><td>(b)</td></tr>
<tr><td>65</td><td colspan="4">In a simplex channel with 5 kbps bandwidth and SNR = 30 dB, what is the maximum data rate according to Shannon’s theorem?</td><td>49.9 kbps</td></tr>
<tr><td></td><td>a) 25 kbps</td><td>b) 50 kbps</td><td>c) 49.9 kbps</td><td>d) 30 kbps</td><td>(c)</td></tr>
<tr><td>66</td><td colspan="4">Which mode of communication is best suited for credit card swiping machines that work alternately with server?</td><td>Half Duplex</td></tr>
<tr><td></td><td>a) Simplex</td><td>b) Half Duplex</td><td>c) Full Duplex</td><td>d) Parallel</td><td>(b)</td></tr>
<tr><td>67</td><td colspan="4">A digital signal of 8 levels is transmitted. What is the bit rate if the baud rate is 1000 symbols/sec?</td><td>3000 bps</td></tr>
<tr><td></td><td>a) 1000 bps</td><td>b) 2000 bps</td><td>c) 3000 bps</td><td>d) 4000 bps</td><td>(b)</td></tr>
<tr><td>68</td><td colspan="4">In Hamming code, if the message length is 7 bits, what is the minimum number of redundant bits required?</td><td>4</td></tr>
<tr><td></td><td>a) 3</td><td>b) 4</td><td>c) 5</td><td>d) 6</td><td>(b)</td></tr>
<tr><td>69</td><td colspan="4">If a signal-to-noise ratio is 20 dB, what is the SNR in linear scale?</td><td>100</td></tr>
<tr><td></td><td>a) 10</td><td>b) 20</td><td>c) 50</td><td>d) 100</td><td>(d)</td></tr>
</table>

70	Match dataset with its population standard deviation. A. {5,5,5,5} — i. 1 B. {2,4,6,8} — ii. $\sqrt{5}$ C. {10,20,30,40} — iii. 0 D. Standard normal random variable Z — iv. $5\sqrt{5}$				Answer
	a) A-i, B-ii, C-iii, D-iv	b) A-iii, B-ii, C-iv, D-i	c) A-ii, B-iii, C-iv, D-i	d) A-iv, B-iii, C-ii, D-i	(b)
71	Type Questions here for matching pairs: A. $\int_0^{\pi} Sin\ x\ dx$ — i. 2 B. $\int_0^{1} x^2\ dx$ — ii. $\frac{1}{3}$ C. $\int_0^{1\infty} e^{-x}\ dx$ — iii. $\frac{\pi}{2}$ D. $\int_0^{\pi} Cos^2\ x\ dx$ — v. 1				Answer
	a) A-i, B-ii, C-iii, D-iv	b) A-ii, B-iii, C-iv, D-i	c) A-ii, B-i, C-iv, D-iii	d) A-iv, B-iii, C-ii, D-i	(c)
72	Type Questions here for matching pairs: A. Binomial(n,p) — i. Discrete, counts of rare events in fixed interval (often limit of Binomial) B. Poisson(λ) — ii. Discrete, fixed number of independent Bernoulli trials C. Normal(μ,σ²) — iii. Continuous, constant density on [0,1] D. Uniform(0,1) — iv. Continuous, symmetric bell-shaped distribution				Answer
	a) A-ii, B-i, C-iv, D-iii	b) A-i, B-iv, C-iii, D-ii	c) A-iv, ,B-iii, C-ii, D-i	d) A-iii, B-ii, C-i, D-iv	(a)
73	Match the normal form with the key concept: A. BCNF — i. No functional dependency B. 4NF — ii. No transitive dependency C. 3NF — iii. No multi-valued dependency D. 2NF — iv. Every determinant is a candidate key				Answer
	a) A-ii, B-iii, C-i, D-iv	b) A-iv, B-iii, C-ii D-i	c)A-iii, B-i, C-ii, D-iv	d) A-i, B-iii, C-ii, D-iv	b) A-iv, B-iii, C-ii D-i

74	Match the violation examples with the NF required: A. Student has multiple hobbies stored independently of subjects — i. 3NF B. City depends on Zip code (non-key attribute) — ii. 4NF C. Subject depends only on part of composite key — iii. 2NF				Answer
	a) A-ii, B-i, C-iii	b) A-ii, B-iii, C-i	c) A-iii, B-i, C-ii	d) A-i, B-iii, C-ii	a) A-ii, B-i, C-iii
75	Match the commands with their language type: A. CREATE — i. DDL B. INSERT — ii. DML C. DROP — iii. DCL				Answer
	a) A-i, B-i, C-ii	b) A-ii, B-i, C-i	c) A-i, B-ii, C-i	d) A-ii, B-ii, C-i	c) A-i, B-ii, C-i
76	Match the JOIN with its output: A. CROSS JOIN — i. Cartesian product (all combinations) B. NATURAL JOIN — ii. Joins a table with itself C. SELF JOIN — iii. Joins on columns with same name automatically				Answer
	a) A-i, B-ii, C-iii	b) A-iii, B-i, C-ii	c) A-ii, B-iii, C-i	d) A-i, B-iii, C-ii	d) A-i, B-iii, C-ii
77	Match the following query with its purpose: A. `SELECT dept,MAX(salary) FROM emp GROUP BY dept;` — i. Employees earning above average salary B. `SELECT name FROM emp WHERE salary > (SELECT AVG(salary) FROM emp);` — ii. Highest salary in each department C. `SELECT * FROM emp WHERE dept IN (SELECT dept FROM emp GROUP BY dept HAVING COUNT(*) > 5);` — iii. Employees in departments with more than 5 people				Answer
	a) A-ii, B-i, C-iii	b) A-iii, B-ii, C-i	c) A-i, B-iii, C-ii	d) A-ii, B-i, C-iii	a) A-ii, B-i, C-iii

78	Match the object with its limitation: A. View — i. May slow down updates/inserts B. Index — ii. Requires extra storage space C. Sequence — iii. May have gaps if transactions rollback				Answer
	a) A-i, B-iii, C-ii	b) A-ii, B-i, C-iii	c) A-iii, B-ii, C-i	d) A-i, B-ii, C-iii	d) A-i, B-ii, C-iii
79	Match the index type with storage/implementation: A. Clustered Index — i. Stores values of multiple columns B. Non-clustered Index — ii. Multiple allowed, separate structure C. Composite Index — iii. Only one per table D. Bitmap Index — iv. Uses bitmaps for column values				Answer
	a) A-iii, B-ii, C-i, D-iv	b) A-iii, B-i, C-iv, D-ii	c) A-ii, B-iii, C-i, D-iv	d) A-i, B-iii, C-ii, D-iv	a) A-iii, B-ii, C-i, D-iv
80	Match subclass/superclass scenarios with relational mapping: A. Total Participation of Subclass — i. Stored in subclass table B. Partial Participation of Subclass — ii. merge subclass with superclass or create separate table C. Attribute of Superclass — iii. Stored in superclass table D. Attribute of Subclass — iv. Separate table for subclass with primary key same as superclass.				Answer
	a) A-ii, B-i, C-iv, D-iii	b) A-iv, B-ii, C-iii, D-i	c) A-iii, B-iv, C-i, D-ii	d) A-iv, B-iii, C-ii, D-i	b) A-iv, B-ii, C-iii, D-i
81	Match relationship with attributes to relational design: A. Many-to-Many with Attributes — i. Create a new table with foreign keys and include relationship attributes B. One-to-Many with Attributes — ii. Include attributes as columns in “many” side table C. One-to-One with Attributes — iii. Use foreign key(s) referencing same table; attributes stored in that table or separate depending on cardinality D. Recursive Relationship with Attributes — iv. Include attributes as columns in any one of the entity tables				Answer

	a) A-iii, B-iv, C-i, D-ii	b) A-ii, B-i, C-iv, D-iii	c) A-i, B-ii, C-iv, D-iii	d) A-iv, B-iii, C-ii, D-i	c) A-i, B-ii, C-iv, D-iii
82	Match the normal form with the key concept: A. BCNF — i. No transitive dependency B. 4NF — ii. No multi-valued dependency C. 3NF — iii. Every determinant is a candidate key				Answer
	a) A-ii, B-iii, C-i	b) A-iii, B-ii, C-i	c) A-iii, B-i, C-ii	d) A-i, B-iii, C-ii	b) A-iii, B-ii, C-i
83	A table has **StudentID - StudentName, StudentID - Skill**. This table:				Answer
	a) Is in 3NF but violates 4NF	b) Is in BCNF	c) Is in 1NF but not in 2NF	d) Has no multi-valued dependencies	a) Is in 3NF but violates 4NF
84	Which of the following Normal Form is violated in this : TeacherID - Subject, Subject - TeacherID				Answer
	a) 2NF	b) 4NF	c) BCNF	d) 3NF	c) BCNF
85	Orders Table: **OrderID** | **CustID** | **Region** 101 | C1 | East 102 | C1 | West 103 | C1 | South 104 | C2 | East 105 | C2 | West Query: SELECT CustID FROM Orders GROUP BY CustID HAVING COUNT(DISTINCT Region) = (SELECT COUNT(DISTINCT Region) FROM Orders); Which customer(s) will appear?				Answer
	a) C1 only	b) C2 only	c) C1 and C2	d) None	a) C1 only
86	Consider the table **Employee**: **EmpID** | **Name** | **Dept** | **Salary** 1 | Amit | HR | 50000				Answer

	2 | Sneha | IT | 60000 3 | Raj | IT | 75000 4 | John | HR | 55000 5 | Priya | Sales | 45000 QUERY: SELECT Dept, Name, Salary FROM Employee e WHERE Salary = (SELECT MAX(Salary) FROM Employee WHERE Dept = e.Dept); What will be the output?				
	a) (IT, Raj, 75000) only	b) (HR, Amit, 50000), (IT, Sneha, 60000), (Sales, Priya, 45000)	c) (HR, John, 55000), (IT, Raj, 75000), (Sales, Priya, 45000)	d) Error due to correlated subquery	c) (HR, John, 55000), (IT, Raj, 75000), (Sales, Priya, 45000)
87	Which of the following statements about Bayesian networks are correct?				Variable elimination is used to determine conditional probabilities
	a) Variable elimination is an approximate inference algorithm	b) Gibbs sampling is an exact inference algorithm	c) Variable elimination is used to determine conditional probabilities	d) Rejection sampling is not an approximate inference algorithm	c
88	You are training a Radial Basis Function (RBF) Support Vector Machine (SVM) with $\left(\gamma = \frac{1}{2\sigma^2}\right)$ where σ^2 represents the variance of the RBF kernel. Which of the following statements is correct?				To prevent overfitting, γ should be decreased.
	a) To prevent overfitting, γ should be decreased.	b) To prevent overfitting, γ should be increased.	c) γ has no predictable impact on overfitting.	d) When γ is decreased, the number of support vectors decreases, indicating the chosen value	a

				likely correspond to overfitting	
89	What is the process of scaling features so that they have a mean of 0 and a standard deviation of 1?				Standardization
	a) Dimensionality reduction	b) Normalization	c) Regularization	d) Standardization	d
90	Which algorithm is employed to reduce the discrepancies between predicted and actual outputs in supervised learning?				Gradient Boosting
	a) Decision Tree	b) Gradient Boosting	c) K-means Clustering	d) Principal Component Analysis (PCA)	b
91	Any decision tree that sorts n elements has height				Ω(n)
	a) Ω(n)	b) Ω(lgn)	c) Ω(nlgn)	d) Ω(n2)	a
92	Select the correct statement(s): A. Time-sharing systems allow multiple remote users to run jobs on the computer at once, such as querying a big database. B. Multitasking refers to the execution of multiple tasks (e.g., processes, programs, threads) at the same time. C. A batch system is one that processes routine jobs without any interactive user present, such as claims processing in an insurance company. D. Real-time systems prioritize tasks with strict timing requirements, such as controlling traffic lights or medical devices.				All statements (A, B, C, and D) are TRUE.
	a) All statements (A, B, C, and D) are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements A and B are TRUE.	d) Only statements A, C, and D are TRUE.	a
93	Select the correct statement(s): A. Virtual memory allows a computer to use disk space as an extension of RAM to handle more processes than physical memory can accommodate. B. Paging is a memory management scheme that divides physical memory into fixed-size blocks called pages and virtual memory into corresponding page frames. C. Fragmentation occurs when memory is divided into small, non-contiguous blocks, making it difficult to allocate space for large processes, and can be resolved by compaction. D. Virtual memory eliminates all instances of fragmentation by ensuring continuous memory allocation.				Only statements A, B, and C are TRUE.

	a) All statements (A, B, C, and D) are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements A and B are TRUE.	d) Only statements B and C are TRUE.	b
94	Select the correct statement(s): A. Pages are fixed-size blocks of virtual memory that are mapped to corresponding frames in physical memory during the paging process. B. Frames are contiguous blocks of physical memory allocated to store pages, and their size is determined by the operating system's page size. C. The Process Control Block (PCB) contains information such as the process state, program counter, and memory allocation details, including page tables. D. Pages and frames must always be of different sizes to ensure efficient memory utilization in a paging system.				Only statements A, B, and C are TRUE.
	a) All statements (A, B, C, and D) are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements A and B are TRUE.	d) Only statements B and C are TRUE.	b
95	Select the correct statement(s): A. Mutual exclusion ensures that only one process can access a shared resource or critical section at a time, preventing race conditions in concurrent processing. B. In concurrent processing, mutual exclusion can be achieved using locks or semaphores to synchronize access to shared resources. C. Mutual exclusion is not necessary in systems where processes do not share any resources, as there is no risk of data inconsistency. D. Implementing mutual exclusion always guarantees a deadlock-free system in concurrent processing environments.				Only statements A, B, and C are TRUE.
	a) All statements (A, B, C, and D) are TRUE.	b) Only statements A, and C are TRUE.	c) Only statements B and C are TRUE.	d) Only statements A, B, and C are TRUE.	d
96	Select the correct statement(s): A. A critical region is a section of code in a concurrent program where a shared resource is accessed, and only one process can execute it at a time to avoid conflicts. B. Critical regions are typically protected using synchronization primitives like mutexes or semaphores to enforce mutual exclusion. C. Any program segment can be designated as a critical region without considering whether it accesses shared resources. D. Critical regions always result in increased execution time due to mandatory synchronization, regardless of the system workload.				Only statements A and B are TRUE.
	a) All statements (A, B, C, and D) are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements A and B are TRUE.	d) Only statements A and C are TRUE.	c

97	Select the correct statement(s): A. Locks are used in concurrent programming to ensure that only one process can access a critical section at a time by acquiring and releasing the lock. B. The unlock operation releases a lock, allowing other waiting processes to acquire it and proceed with their critical section execution. C. Locks can be implemented without any mechanism to handle deadlocks, as they are inherently safe in all concurrent systems. D. Unlocking a lock that has not been previously locked by the same process will always result in a system crash.				Only statements A and B are TRUE.
	a) Only statements C and D are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements B and C are TRUE.	d) Only statements A and B are TRUE.	d
98	Select the correct statement(s): A. CPU scheduling determines which process in the ready queue is allocated the CPU next, aiming to optimize throughput and reduce waiting time. B. I/O scheduling manages the order in which I/O requests are serviced, prioritizing based on factors like response time and fairness to improve disk or network performance. C. CPU scheduling and I/O scheduling are identical processes, as both deal with allocating resources to processes in a similar manner. D. I/O scheduling can be bypassed in systems where processes do not perform any input/output operations, eliminating the need for a scheduler.				Only statements A and B are TRUE.
	a) Only statements A and B are TRUE.	b) Only statements A, B, and C are TRUE.	c) Only statements B and C are TRUE.	d) Only statements B and D are TRUE.	a
99	Select the correct statement(s): A. Resource scheduling involves allocating system resources, such as CPU, memory, and I/O devices, to processes based on their priority and availability. B. Resource scheduling ensures efficient utilization of resources by preventing over-allocation and deadlocks through proper management techniques. C. Resource scheduling is only applicable to CPU and memory, excluding I/O devices which are managed separately. D. Dynamic resource scheduling adjusts allocations in real-time based on changing workload demands, improving system adaptability.				Only statements A, B, and D are TRUE.
	a) Only statements A, B, and C are TRUE.	b) Only statements A, and D are TRUE.	c) Only statements A and B are TRUE.	d) Only statements A, B, and D are TRUE.	d
100	Select the correct statement(s): A. A deadlock occurs when two or more processes are indefinitely blocked, each waiting for a resource held by another, which can be prevented by resource ordering in scheduling algorithms. B. Scheduling algorithms, such as Round Robin, can directly resolve deadlocks by prioritizing processes based on their waiting time. C. Deadlock prevention techniques, like the banker's algorithm, are integrated into scheduling algorithms to ensure safe resource allocation. D. Scheduling algorithms have no influence on deadlock occurrence, as deadlocks are solely dependent on resource management policies.				Only statements A and C are TRUE.

	a) Only statements A, B, and C are TRUE.	b) Only statements B and D are TRUE.	c) Only statements A and C are TRUE.	d) Only statements B and C are TRUE.	c
101	Select the correct statement(s): A. The Banker's algorithm prevents deadlocks by ensuring that resource allocation only occurs if the system remains in a safe state, where all processes can complete. B. The conditions for deadlock include mutual exclusion, hold and wait, no preemption, and circular wait, all of which must be present simultaneously. C. The Banker's algorithm can handle deadlocks after they occur by terminating processes to release resources, similar to deadlock detection and recovery. D. A deadlock can be avoided if any one of the four necessary conditions is eliminated, making the Banker's algorithm sufficient on its own to prevent all deadlocks.				Only statements A and B are TRUE.
	a) Only statements B and C are TRUE.	b) Only statements A and B are TRUE.	c) Only statements A, B, and C are TRUE.	d) All statements (A, B, C, and D) are TRUE.	b
102	What is the process of applying the Banker's algorithm to ensure a system with 4 processes (P1, P2, P3, P4) and 3 resource types (A, B, C) remains in a safe state, given the following conditions: Available = [1, 1, 0], Maximum Demand = [P1: [3, 2, 1], P2: [2, 1, 2], P3: [2, 2, 1], P4: [1, 3, 1]], and Allocated = [P1: [1, 1, 0], P2: [1, 0, 1], P3: [1, 1, 0], P4: [0, 1, 1]]?				Calculate the Need matrix as [P1: [2, 1, 1], P2: [1, 1, 1], P3: [1, 1, 1], P4: [1, 2, 0]], determine a safe sequence [P2, P4, P1, P3], and compute the final Available vector as [4, 4, 3] after all processes complete.
	a) Calculate the Need matrix as [P1: [2, 1, 1], P2: [1, 1, 1], P3: [1, 1, 1], P4: [1, 2, 0]], determine a safe sequence [P2, P4, P1, P3], and compute the final Available vector	b) If P3 requests [1, 0, 0], grant the request, update Available to [0, 1, 0], and confirm a safe sequence [P2, P1, P3,	c) Analyze the total resource capacity as [4, 4, 2] and total Need as [5, 5, 3], concluding that the system is always safe	d) Add a new process P5 with Maximum Demand [2, 1, 1] and Available [0, 0, 0], and allocate [1, 0, 0] to P5	a

	as [4, 4, 3] after all processes complete.	P4] without recomputing Need.	regardless of allocation.	immediately to maintain a safe state.	
103	Which of the following statements about virtual memory is correct?				Virtual memory allows programs to use more memory than the physical RAM installed in the system.
	a) Virtual memory increases internal fragmentation by allocating memory in large blocks.	b) Virtual memory allows programs to use more memory than the physical RAM installed in the system.	c) Virtual memory cannot use disk storage as part of the address space.	d) Virtual memory eliminates the need for mapping logical addresses to physical addresses.	b
104	In a paging-based memory management system with page size of 4 KB, physical memory of 64 KB, and logical address space of 256 KB, which of the following statements is true?				Internal fragmentation occurs because a process may not fully use the last page allocated to it.
	a) Paging completely eliminates both internal and external fragmentation.	b) Internal fragmentation occurs because a process may not fully use the last page allocated to it.	c) External fragmentation arises frequently because fixed-size pages cause memory to become scattered.	d) The page table size decreases as the page size decreases because fewer pages are needed.	b

105	Which of the following statements correctly describes the principle of mutual exclusion and critical regions in operating systems?				A critical region is a section of code where shared resources are accessed, and only one process can execute in its critical region at any time to avoid race conditions.
	a) Mutual exclusion allows multiple processes to simultaneously execute in their critical regions to maximize resource utilization.	b) Critical regions require processes to wait indefinitely to ensure fairness in access to shared resources.	c) Disabling interrupts is an ineffective method to guarantee mutual exclusion in both uniprocessor and multiprocessor systems.	d) A critical region is a section of code where shared resources are accessed, and only one process can execute in its critical region at any time to avoid race conditions.	d
106	Consider a system with 5 processes and 7 identical resources. Each process requires a maximum of 3 resources. Using the Banker's algorithm, which of the following conditions ensures the system is in a safe state?				Answer
	a) The system has at least 3 available resources at the start, as 7 – 5 + 1 = 3.	b) The total number of resources R should satisfy $R \geq$ *sum of maximum needs* for all processes combined.	c)The system can be safe if minimum of 15 resources are available simultaneously.	d)The system is safe if the total available resources R satisfy $R \geq m \times (n-1)+1$, where m is the maximum demand per process, and n is the number of processes.	d

107	Which of the following types of polymorphism is supported by C++?				Answer
	a) Static and Dynamic	b) Implicit and Explicit	c) Compile-time and Runtime	d) Both a and c are correct	(d)
108	What happens if an exception is thrown but not caught in C++?				Answer
	a) The program terminates abnormally	b) The program will hang indefinitely	c) The program runs normally	d) The program skips the error	(a)
109	What is the main advantage of using inheritance?				Answer
	a) Reduces execution time	b) Simplifies memory management	c) Promotes code reuse and modularity	d) Increases file size	(c)
110	What is required for a function to exhibit dynamic polymorphism?				Answer
	a) It must be declared as static	b) It must be declared as inline	c) It must be a virtual function in the base class and overridden in the derived class	d) It must be overloaded in the same class	(c)
111	What is the output type of the `malloc( )` function in C?				Answer
	a) int	b) void*	c) char	d) int*	(b)
112	Which of the following best defines function overloading?				Answer
	a) Having multiple base classes	b) Reusing code in multiple files	c) Having multiple functions with the same name but different parameters	d) Inheriting properties from another class	(c)
113	What is the main purpose of using structures in C?				Answer
	a) To allocate memory dynamically	b) To group variables of different data types under one name	c) To hide data from other functions	d) To perform arithmetic operations	(b)
114	What will happen if you try to access a memory location through an uninitialized pointer?				Answer
	a) It will store zero	b) It will give a compilation error	c) It will access the correct value	d) It may cause undefined	(d)

				behavior or a crash	
115	What are tokens in C?				Answer
	a) Reserved memory spaces	b) Predefined functions	c) The smallest individual units in a C program	d) Error messages	(c)
116	Which of the following best distinguishes a `union` from a `struct` in C?				Answer
	a) A union can only hold integer data	b) All members of a union share the same memory location	c) Structures are faster than unions	d) Unions cannot have more than two members	(b)
117	A: Assertion : A class in C++ can have multiple constructors. B: Justification : Constructor overloading allows the creation of multiple constructors with different parameter lists.				Answer
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(a)
118	A: Assertion: If a class has a virtual destructor, it ensures proper destruction of derived class objects via base class pointers. B: Justification : Virtual destructors allow the program to call the destructor of the base class only.				Answer
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(c)
119	A: Assertion: The scanf() function can be used to read strings in C. B: Justification: scanf() automatically adds a null character at the end of the input string.				Answer
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(a)
120	A: Assertion: Templates allow functions and classes to operate with generic types. B: Justification: Templates enable code reuse for different data types without rewriting the function or class.				Answer
	a) Both A and B are true, and B is the	b) Both A and B are true, but B is not the	c) A is true, but B is false.	d) A is false, but B is true.	(a)

	correct explanation of A.	correct explanation of A.			
121	A: Assertion : A class can have only one destructor. B: Justification: You must explicitly call a destructor to destroy an object.				Answer
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(c)
122	A: Assertion: Template functions are instantiated only when they are called in the program. B: Justification: Templates increase the runtime speed of a program by avoiding function calls.				
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	(b)
123	Assertion (A): Confidentiality policies ensure that sensitive information is not disclosed to unauthorized users. Reason (R): Confidentiality is violated if an unauthorized subject reads information they are not permitted to access.				Both A and R are true, and R is the correct explanation of A
	a) Both A and R are true, and R is the correct explanation of A	b) Both A and R are true, but R is not the correct explanation of A	c) A is true, but R is false	d) A is false, but R is true.	a) Both A and R are true, and R is the correct explanation of A
124	Assertion (A): In information security, assumptions about trusted components must be continuously evaluated. Reason (R): A component trusted today may become vulnerable tomorrow due to new threats or exploits.				Both A and R are true, and R is the correct explanation of A
	a) A is false, but R is true	b) Both A and R are true, but R is not the correct explanation of A	c) A is true, but R is false	d) Both A and R are true, and R is the correct explanation of A	D
125	Assertion (A): Human issues are often considered the weakest link in information security. Reason (R): Technical controls such as firewalls and encryption are infallible, so breaches happen only because of people.				A is true, but R is false

	a) Both A and R are true, and R is the correct explanation of A	b) Both A and R are true, but R is not the correct explanation of A	c) A is true, but R is false	d) Both A and R are false	C
126	**Assertion (A):** Integrity policies ensure that sensitive information is not modified in an unauthorized manner. **Reason (R):** The Bell-LaPadula model enforces integrity by preventing "write up" and "read down."				A is true, but R is false
	a) Both A and R are true, and R is the correct explanation of A	b) Both A and R are true, but R is not the correct explanation of A	c) Both A and R are false	d) A is true, but R is false	D
127	In information security, what does *assurance* primarily refer to?				Providing confidence that security goals are met through testing, verification, audits, and monitoring.
	a) Guaranteeing zero defects in software through encryption	b) Providing confidence that security goals are met through testing, verification, audits, and monitoring	c) Assigning trust levels to users based on assumptions	d) Ensuring confidentiality only, regardless of integrity and availability	B
128	What is the primary difference between multiprogramming and multitasking?				Multiprogramming manages multiple jobs in memory, while multitasking adds CPU time-sharing.
	a) Multiprogramming uses multiple CPUs, while	b) Multiprogramming supports	c)Multiprogramming manages multiple jobs	d)They are identical terms.	**C**

	multitasking uses one.	multiple users, while multitasking does not.	in memory, while multitasking adds CPU time-sharing.		
129	Which of the following is *not* typically considered a phase of the System Development Life Cycle (SDLC)?				System conversio n
	a) Requirements analysis	b) System design	c) Implementation (coding)	d) System conversion	D
130	Which statement best describes the Waterfall model?				It is a linear-sequential model where each phase must complete before the next begins.
	a) It is iterative and risk-driven with repeated cycles	b) It is a linear-sequential model where each phase must complete before the next begins.	c) It relies on building throwaway prototypes to discover requirements.	d) It emphasizes object-oriented incremental delivery.	C
131	What is the primary advantage of the Spiral model over Waterfall?				It treats risk assessmen t explicitly and iteratively in each cycle.
	a) It eliminates the need for requirements documentation.	b) It treats risk assessment explicitly and iteratively in each cycle.	c) It guarantees zero defects at release.	d) It requires fewer customer interactions.	B
132	Which scheduling algorithm can potentially lead to starvation?				Shortest Job First (SJF)
	a) First-Come, First-Served (FCFS)	b) Shortest Job First (SJF)	c)Round Robin (RR)	d) All of the above	B
133	Which metric is commonly used to measure testing effectiveness in terms of how much of the program's code has been exercised by tests?				Test coverage
	a) Defect density (defects per KLOC)	b)Cyclomatic complexity	c) Test coverage	d) Mean Time to Repair (MTTR)	C
134	What do the Agile Manifesto principles primarily emphasize?				Customer collabora tion,

					working software, responding to change, and valuing individuals and interactions
	a) Following strict processes and comprehensive documentation over flexibility	b) Customer collaboration, working software, responding to change, and valuing individuals and interactions	c) Extensive upfront planning and contract negotiation before development begins	d) Maximizing tool usage and minimizing human involvement in software development	**B**
135	Which of the following best explains why the Cleanroom approach emphasizes formal specification and correctness proofs?				To reduce the introduction of defects during development and improve reliability
	a) To eliminate the need for testing completely	b) To reduce the introduction of defects during development and improve reliability	c) To speed up coding by skipping documentation	d) To allow developers to focus only on user interface design	**B**
136	Which of the following metrics is most commonly used to measure the *logical complexity* of code and estimate the number of test cases required?				Cyclomatic Complexity
	a) Lines of Code (LOC)	b) Mean Time Between Failures (MTBF)	c) Function Points	d) Cyclomatic Complexity	**D**
137	Match the pair as per there functionalities: A. Application (OSI) — i. Network Access B. Transport (OSI) — ii. Internet C. Network (OSI) — iii. Transport D. Data Link + Physical (OSI) — iv. Application				Answer

	a) A-i, B-ii, C-iii, D-iv	b) A-iv, B-iii, C-ii, D-i	c) A-i, B-iii, C-iv, D-ii	d) A-ii, B-iv, C-i, D-iii	(b)
138	Match correctly the following: A. Echo request/reply — i. Router signals packet can't be delivered B. Destination unreachable — ii. Loop prevention C. TTL exceeded — iii. Ping D. Redirect — iv. Router suggests better path				Answer
	a) A-ii, B-iii, C-i, D-iv	b) A-i, B-ii, C-iii, D-iv	c) A-iii, B-i, C-ii, D-iv	d) A-iv, B-i, C-ii, D-iii	(c)
139	Match the following with regard to application layer: A. HTTP — i. Web browsing B. FTP — ii. IP address allocation C. DNS — iii. File transfer D. DHCP — iv. Name resolution				Answer
	a) A-i, B-ii, C-iii, D-iv	b) A-i, B-iv, C-iii, D-ii	c) A-ii, B-iv, C-ii, D-i	d) A-i, B-iii, C-iv, D-ii	(d)
140	Match the following pair correctly: A. Socket() — i. Creates socket endpoint B. Bind() — ii. Assigns address/port C. Listen() — iii. Prepares for incoming connections D. Accept() — iv. Accepts a connection request				Answer
	a) A-iv, B-iii, C-ii, D-i	b) A-ii, B-iii, C-iv, D-i	c) A-i, B-ii, C-iii, D-iv	d) A-ii, B-i, C-iv, D-iii	(c)
141	Match the following pair correctly. A. SMTP — i. Extensions for attachments B. POP3 — ii. Retrieval, keeps mail on server C. IMAP — iii. iii. Simple retrieval, downloads & deletes D. MIME — iv. Sending mail protocol				Answer

	a) A-iv, B-iii, C-ii, D-i	b) A-ii, B-iii, C-iv, D-i	c) A-i, B-ii, C-iii, D-iv	d) A-iv, B-ii, C-i, D-iii	(a)
142	Match the following protocols with their corresponding port no. A. HTTP — i. Port 25 B. HTTPS — ii. Port 80 C. FTP — iii. Port 21 D. SMTP — iv. Port 443				Answer
	a) A-ii, B-iv, C-iii, D-i	b) A-i, B-ii, C-iii, D-iv	c) A-ii, B-iii, C-iv, D-i	d) A-iv, B-ii, C-iii, D-i	(a)
143	Match correctly the following pairs: A. ARP — i. MAC → IP B. RARP — ii. Dynamic IP assignment C. DHCP — iii. IP → MAC resolution D. ICMP — iv. Error & diagnostic messages				Answer
	a) A-i, B-ii, C-iii, D-iv	b) A-iii, B-ii, C-iv, D-i	c) A-iii, B-iv C-i, D-ii	d) A-iii B-i, C-ii, D- iv	(d)
144	Match correctly the following pairs: A. Flooding — i. Each node forwards to all neighbors B. Shortest Path — ii. Reliable but overhead of LSP flooding C. Distance Vector — iii. Uses Bellman-Ford D. Link State — iv. Uses Dijkstra's algorithm				Answer
	a) A-iv, B-ii, C-iii, D-i	b) A-i, B-iii, C-iv, D-ii	c) A-i, B-ii, C-iii, D-iv	d) A-ii, B-iii, C-i, D-iv	(b)
145	Match the following pairs correctly: A. Bridge — i. Works at Layer 2, forward by MAC B. Switch — ii. Multiport bridge with hardware switching				Answer

	C. Hub		iii. Broadcasts to all ports, Layer 1		
	D. Router		iv. Works at Layer 3, forward by IP		
	a) A-iii, B-iv, C-i, D-ii	b) A-iv, B-iii, C-ii, D-i	c) A-ii, B-iii, C-iv, D-i	d) A-i, B-ii, C-iii, D-iv	(d)
146	In the OSI model, which layer is responsible for end-to-end delivery of a message?				Answer
	a) Data Link Layer	b) Network Layer	c) Transport Layer	d) Application Layer	(c)
147	The main disadvantage of Distance Vector routing protocol is:				Answer
	a) High convergence speed	b) Count-to-infinity problem	c) Requires global knowledge of network	d) Works only in small networks	(b)
148	A TCP connection has a window size of 20 KB. If the RTT is 100 ms, what is the maximum possible throughput?				Answer
	a) 160 Kbps	b) 200 Kbps	c) 2 Mbps	d) 1.6 Mbps	(d)
149	A 1 Mbps link is used to transmit a 1 MB file. Propagation delay = 20 ms. What is the total transmission + propagation delay?				Answer
	a) 8.02 sec	b) 8.20 sec	c) 8.40 sec	d) 10 sec	(a)
150	For data bits 1101 and generator polynomial 1011, what is the remainder after division (CRC)?				Answer
	a) 001	b) 010	c) 011	d) 100	(a)