Rajasthan Public Service Commission, Ajmer

RPSC PROGRAMMER (Paper-I & II)

Solved Papers & Practice Book

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₹ 295/-

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SOLVED PAPERS

PRACTICE SET

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF PROGRAMMER DEPARTMENT OF INFORMATION TECHNOLOGY AND COMMUNICATION

PAPER-I

1. **Reasoning Test & Numerical Analysis & General Knowledge**

   Problem solving, Data Interpretation, Data Sufficiency, Logical Reasoning and Analytical Reasoning. General Knowledge and Current Affairs relating to India and Rajasthan.

2. **Data Base Management Systems**

   ER Diagram, data models- Relational and Object Oriented databases. Data Base Design: Conceptual data base design, Normalization Primitive and Composite data types, concept of physical and logical databases, data abstraction and data independence, data aggregation and Relational Algebra.

   Application Development using SQL: Host Language interface, embedded SQL programming, Stored procedures and triggers and views, Constraints assertions.

   Internal of RDBMS: Physical data organisation in sequential, indexed random and hashed files. Inverted and multilist structures, B trees, B+ trees, Query Optimisation, Join algorithm.

   Transaction Processing, concurrency control and recovery management. Transaction model Properties and state serialisability. Lock base protocols, two phase locking.

3. **Data Communication and Computer Networks**

   Computer Network Architecture, Circuit Switching, Packet And Massage Switching, Network Structure. Physical Layer, Data Link Layer, Framing. Retransmission algorithms.

   Multiple access and Aloha. CSMA/CD and Ethernet. High Speed LANs and topologies. Broadcast routing and spanning trees.

   TCP/IP Stack. IP Networks and Internet. DNS and Firewalls. Intrusion Detection and Prevention.

   Transport layer and TCP/IP. Network Management and Interoperability.

PAPER-II

4. System Analysis and Design

System concept: Definition and characteristics, elements and boundaries, types of system development lifecycle, recognition of needs, feasibility study, prototyping, role of system analyst.

System planning and tools like DFD, data dictionary, decision trees, structured analysis and decision tables.

IPO charts, structured walkthrough, input output form design, requirement and classification of forms, layout considerations form control, object oriented Design Concepts and methods.

Software Life Cycle, Software Engineering paradigms.

System analysis: Feasibility study requirement analysis, Cost benefit analysis, Planning systems, Analysis tools and techniques.

System Design: design fundamentals, Modular Design, Data and procedural design, object oriented design.

System Development: Code documentation, Program design paradigms, Efficiency Consideration.

Verification, Validation and Testing: testing methods, Formal Program Verification, Testing Strategies.

Software Maintenance: Maintenance Characteristics, Maintainability, Maintenance tasks and side effects.

5. Programming Concepts

Introduction: Internet, Java as a tool for internet applications, Byte Code and its advantages.

Object Oriented Programming and Design: Review of Abstraction, Objects and other basics, Encapsulation, Information hiding, Method, Signature, Classes and Instances, Polymorphism, Inheritance, Exceptions and Exception Handling with reference to object modeling, Coupling and Cohesion in object oriented software. Object Oriented Design – Process, Exploration and Analysis.

Java Programming Basics: Variables and assignments, Input and Output, Data Types and Expressions, Flow of control, Local variables, Overloading Parameter passing, this pointer, Java Object Oriented Concepts: Use of file for I/O, Formatting output with stream functions, Character I/O, Inheritance, Public and private members, Constructors for initializations, Derived classes, Flow of Control Arrays- Programming with arrays, arrays of classes, arrays as function arguments, Strings, Multidimensional arrays, Arrays of strings, vectors, Base classes.

Introduction to JSP, RMI, java Applets and servlets.

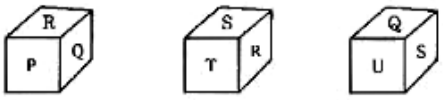
Introduction to DotNet framework and visual programming interface.

Rajasthan Public Service Commission Exam, 2013
Programmer (Paper-II)
Solved with Explanation (Exam Date : 18.02.2014, Shift-I)

1. How many number lie between 300 and 500 in which 4 comes only one ?
300 तथा 500 के बीच कितनी ऐसी संख्याएँ होगी जिसमें 4 केवल एक बार आयेगा?
(a) 98 (b) 99
(c) 100 (d) 101

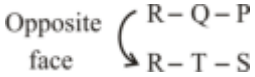
Ans. (b) : According to question,
300 to 500 Break into two groups:
Case I. 301 to 399
304, 314, 324, 334, 354, 364, 374, 384, 394 = 9
340, 341, 342, 343, 345, 346, 347, 348, 349 = 9
Total no. of four between 300 to 399 is = 9 + 9 = 18 number with one 4.
Case 2. 400 to 499. = 100, Number with one or more 4
404, 414, 424, 434, 454, 464, 474, 484, 494 = 9
440, 441, 442, 443, 445, 446, 447, 448, 449 = 9
18 no with 2 four.
444 = 1, 1 no with 3 four.
9 + 9 + 1 = 19 no. has more than one 4
Total Numbers = 18 + 100 – 19
= 99

2. Three views of a cube following a particular motion are given below:
एक घन के तीन विभिन्न आकृतियों को नीचे दिए गए विशेष प्रकार से दिया गया है:



What is the letter opposite to P?
P अक्षर के विपरित अक्षर कौन सा है?
(a) S (b) T
(c) R (d) U

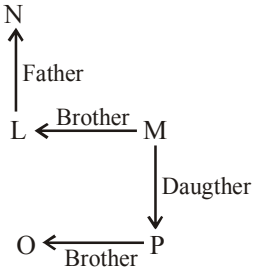
Ans. (a) : According to question,
On rotating the cube (I) and (II) in clockwise direction:-



Hence, it is clear that opposite letter to P is S.

3. Given that:/दिया है:
(i) L is the brother of M/ L, M का भाई है
(ii) N is the father of L/ N, L का पिता है
(iii) O is the bother of P/ O, P का भाई है
(iv) P is the daughter of M/ P, M की पुत्री है
Then the uncle of O is-
तब O के चाचा है-
(a) L (b) M
(c) N (d) P

Ans. (a) : On making the blood-relation diagram :-



Hence, it is clear from the diagram that 'L' is uncle of O.

4. If a car moves from Jaipur to Delhi at a speed of 60 km/hr and comes back from Delhi to Jaipur at a speed of 40 km/hr. What is the average speed during the journey?
यदि एक कार जयपुर से दिल्ली 60 किमी/घण्टा की चाल से चलती है, तथा वही कार दिल्ली से जयपुर 40 किमी/घण्टा की चाल से आती है। यात्रा के दौरान कार की औसत चाल क्या है?
(a) 46 km/hr/46 किमी/घण्टा
(b) 48 km/hr/48 किमी/घण्टा
(c) 50 km/hr/50 किमी/घण्टा
(d) 52 km/hr/52 किमी/घण्टा

Ans. (b) : Given that,
$v_1 = 60$ km/hr.
$v_2 = 40$ km/hr.

$$\text{Average speed} = \frac{2 \times v_1 \times v_2}{v_1 + v_2}$$
$$= \frac{2 \times 60 \times 40}{60 + 40}$$
$$= \frac{4800}{100}$$
$$= 48 \text{ km/hr.}$$

5. Statement If P = x% of y
Q = y% of x.
Then which of the following is true based on statement?
कथन यदि P = x% का y
Q = y% का x
तो कथन के अनुसार निम्न में से कौन सा सत्य है?
(a) P > Q
(b) P < Q
(c) P = Q
(d) None of these/इनमें से कोई नहीं

Ans. (c) : Given,
From, statement

$$P = x\% \text{ of } y$$

$$= \frac{x}{100} \times y \quad = \frac{xy}{100}$$

$$Q = y\% \text{ of } x$$

$$= \frac{y}{100} \times x \quad = \frac{yx}{100}$$

Hence, from the statement it is clear that P = Q is correct.
∴ The statement of option (c) is true.

6. The number following a specific pattern. The missing number is-
निम्न संख्याएँ एक विशेष प्रकार से लिखी गई है, अज्ञात संख्या होगी–

84	**81**	**88**
14 12	**18 9**	**? 11**
(i)	**(ii)**	**(iii)**

(a) 8 (b) 12
(c) 16 (d) 22

Ans. (c) : According to question,
Just as,

$$\frac{14}{2} \times 12 = 84$$

and, $\frac{18}{2} \times 9 = 81$

same as, $\frac{?}{2} \times 11 = 88$

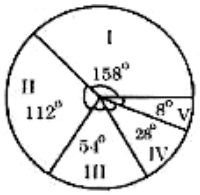
$\boxed{? = 16}$

7. The remainder obtained when a prime number greater than 6 is divisible by 6 is:
6 से बड़ी अभाज्य संख्या को 6 से विभाजित करने पर शेषफल प्राप्त होगा।

(a) 1 or 3/1 या 3 (b) 3 or 5/3 या 5
(c) 2 or 5/2 या 5 (d) 1 or 5/1 या 5

Ans. (d) : Let the required prime number be P.
Let when p is divided by 6 quotient is n and remainder is r.
then p = 6n + r, where. $0 \le r < 6$
Now, r = 0, r = 3 and r = 4 do not given as prime.
So, $r \neq 0$, $r \neq 2$, $r \neq 3$ and $r \neq 4$
∴ r = 1, or r = 5

8. The total population in a city is 40,000. The various sections of them are indicated below in the circle diagram:
एक शहर की जनसंख्या 40,000 है। इनके विभिन्न समूहों को नीचे दिए गए वृत्त आरेख में दर्शाया गया है:



I. Employed in public sector
सार्वजनिक क्षेत्र में रोजगाररत
II. Employed in private sector
निजी क्षेत्र में रोजगाररत
III. Employed in corporate sector
निगमित क्षेत्र में रोजगाररत
IV. Self employed/स्वरोजगारयुक्त
V. Unemployed./बेरोजगार

The number of person employed in corporate sector is–
निगमित क्षेत्र में रोजगार प्राप्त व्यक्तियों की संख्या है–

(a) 3000 (b) 6000
(c) 8000 (d) 9000

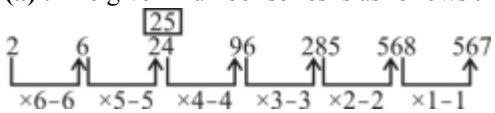
Ans. (b) : From the diagram of various sections.
the number of Employed in corporate sector is = $\frac{54}{360} \times 40000 = 6000$
Hence, option (b) is correct.

9. In the following number series, one number is wrong. Find the odd number
निम्नलिखित संख्या श्रृंखला में एक संख्या गलत है, विषम (गलत) संख्या है-

2, 6, 24, 96, 285, 568, 567

(a) 24 (b) 96
(c) 285 (d) 567

Ans. (a) : The given number series is as follows :-



Hence in the given series the odd number is 24. So, Option (a) is correct.

10. A question and two statement numbered I and II are given. Answer the statements based on the data available:
एक प्रश्न तथा दो कथन (I व II) दिए गए है। कथनों में उपलब्ध आंकड़ों के आधार पर उत्तर दे:

Question : What is the sum of 5 real number?/
प्रश्न : 5 वास्तविक संख्याओं का योग क्या होगा?

Statements : (I) The product of the number is 630.
कथन: (I) संख्याओं का गुणनफल 630 है।
(II) The average of the number is 30
(II) संख्याओं का औसत 30 है।

(a) If the data in statement I alone is sufficient to answer the question./यदि प्रश्न का उत्तर देने के लिए मात्र कथन I के ही आँकडे पर्याप्त है।
(b) If the data in statement II alone is sufficient to answer the question/यदि प्रश्न की उत्तर देने के लिए मात्र कथन II के ही आँकड़े पर्याप्त है।
(c) If the data even in both statement I and II together is sufficient to answer the questions/यदि प्रश्न की उत्तर देने के लिए कथन I और II दोनों के आँकड़े मिलकर पर्याप्त हैं।

(d) If the data neither statement I nor statement II is sufficient to answer the question./यदि न तो तो कथन I और न ही कथन II के आँकड़े प्रश्न के उत्तर देने में पर्याप्त हैं।

Ans. (b) : According to question,
Let five real no is x, (x + 1), (x + 2) (x + 3), (x + 4)
Statement - I,
(Product of all five number is) 630 is not sufficient to answer question. Hence statement I is not correct.
Statement-II.

$$\text{Average of numbers} = \frac{x+x+1+x+2+x+3+x+4}{5}$$

$$30 = \frac{5x+10}{5}$$

$$\text{or} \quad x = \frac{140}{5}$$

$$x = 28$$

So, the sum of five real no is =
28 + 29 + 30 + 31 + 32 = 150
Hence, statement II alone is sufficient to answer the question.
So, option (b) is correct.

11. The Chief of Army staff of India is-
भारत के थल सेनाध्यक्ष हैं-
(a) Bikram Singh/बिक्रम सिंह
(b) Bimal Kumar/बिमल कुमार
(c) V.K. Singh/वी. के सिंह
(d) D. K joshi/डी. के. जोशी

Ans. (a) : In 2012, General Bikram Singh was the 24th chief of Army Staff of the India Army while currently as of Aug, 2024 Mr. Upendra Dwivedi is the 30th chief of Army staff of the India Army.

12. The Agni-IV Missile was tested on-
अग्नि- IV मिसाइल का परीक्षण किया गया–
(a) November, 2012/नवम्बर, 2012
(b) September, 2012/सितम्बर, 2012
(c) December, 2010/दिसंबर, 2010
(d) September, 2010/सितम्बर, 2010

Ans. (*) : The Agni-IV, an intermediate range ballistic missile (IRBM) developed by Defence Research and Development Organization (DRDO). In September 19, 2012 the Agni-iv missile was successfully test fired from wheeler Island off the coast of Odisha.
Note:- This question was deleted by Rajasthan State Lok Sewa Aayog.

13. Who first used the word Swaraj?
किसने सर्वप्रथम स्वराज शब्द का प्रयोग किया?
(a) Ram Mohan Roy/राम मोहन राय
(b) Ram Krishna Paramhansa /राम कृष्ण परमहंस
(c) Swami Dayanand/स्वामी दयानंद
(d) S. N. Benerjee/एस. एन. बनर्जी

Ans. (c) : In 1876, Swami Daynand Saraswati was the first to call for " Swarajya". Which means India for Indians". Me drew inspiration from the reads, which he considered infallible.

14. How many persons have been honoured with Bharat Ratna till now?
कितने लोगों को अभी तक भारत रत्न से सम्मानित किया गया है?
(a) 60 (b) 41
(c) 61 (d) 43

Ans. (b) : In 2012, 41 people have received the Bharat Ratna. Currently as of Aug, 2024, 53 people have received the Bharat Ratna. Bharat Ratna is India's highest civilian award, Since it was established in 1954.

15. Hawa Mahal at Jaipur was constructed by-
जयपुर स्थित हवामहल का निर्माण कराया-
(a) Man Singh/मानसिंह (b) Ram Singh/रामसिंह
(c) Pratap Singh/प्रतापसिंह (d) Jai Singh/जयसिंह

Ans. (c) : The Hawa Mahal, or 'the Palace of Winds', was built in 1799 by the then King of Jaipur, Maharaja Sawai Pratap Singh of the Kachwala Rajput dynasty.

16. The total length of roads in Rajasthan in March
मार्च, 2012 तक राजस्थान में सड़कों की कुल लंबाई थी-
(a) 189402 km/189402 किमी.
(b) 199502 km/199502 किमी.
(c) 170402 km/170402 किमी.
(d) 155372 km/155372 किमी.

Ans. (a) : In March 2012, total length of roads in Rajasthan was 189402 km. Currently as of March 2021, Rajasthan had a total road length of 272,959.28 Kilometers.

17. When was the 'MGRNEGA' first launched in Rajasthan?
राजस्थान में 'मनरेगा' सर्वप्रथम कब प्रारंभ की गयी?
(a) 2nd Feb. 2006/2 फरवरी, 2006
(b) 2nd May, 2007/ 2 मई, 2007
(c) 1st April, 2008/ 1 अप्रैल, 2008
(d) 2nd Feb. 2009/2 फरवरी, 2009

Ans. (a) : Mahatma Gandhi National Rural Employment Guarantee Scheme was started on 2nd February 2006 in Rajasthan. This scheme is based under National Rural employment Guarantee Act 2005 (NREGA)

18. The Mangarh Dham is situated in the district-
मानगढ़ धाम जिस जिले में स्थित है-
(a) Dungarpur/डूंगरपुर (b) Udaipur/उदयपुर
(c) Chittorgarh/चित्तौड़गढ (d) Banswara/बांसवाड़ा

Ans. (d) : 'Mangharh Dham' is located in Banswara district. In the year 1913, Under the leadership of Gorind Guru, about 1500 Bhil Adivasi ware martyred while fighting for the freedom from the British.

19. The Tenth Pravasi Bhartiya Divas Conclave was held at-
दसवाँ प्रवासी भारतीय दिवस कॉन्क्लेव सम्पन्न हुआ-
(a) Ajmer/अजमेर (b) New Delhi/नई दिल्ली
(c) Mumbai/मुम्बई (d) Jaipur/जयपुर

Ans. (d) : The 10th Pravasi Bharatiya Divas (PBD) also known as Non- Resident Indian (NRI) day, was held in Jaipur, Rajasthan from January 7 - 9, 2012 and currently as of the 16th Pravasi Bhratiya Divas was held during 8 - 10 January at Indore.

20. The amount fixed for the Chief Minister Scholarship for higher education in Rajasthan is-
राजस्थान में उच्च शिक्षा हेतु मुख्यमंत्री छात्रवृत्ति योजना में निर्धारित राशि है–

(a) ₹5000 (b) ₹6000
(c) ₹7000 (d) ₹8000

Ans. (a) : Chief Minister Scholarship for higher education in Rajasthan is mega Scholarship of the state government where 5000 Rs. per year is given to each student who fulfills conditions like at least 60% in last exam passed with no gap being regular student of the college, income of the parents less than 250000 etc.

21. Which one of the following problems can occur due to introducing locks in a concurrent transaction scenario?

(a) Information overwrite
(b) Loss of information
(c) Deadlock
(d) Lack of integrity

Ans. (c) : Deadlock occurs when two or more transactions are waiting indefinitely for each other to release locks. While locks are used to ensure consistency and prevent issues like information overwrite or loss of integrity, they can lead to deadlock if not managed carefully.

22. Which one of the following techniques is sometimes used to solve integrity problems in a concurrent transaction scenario?

(a) First come first-served
(b) Greedy algorithms
(c) Stassen's algorithm
(d) Two-phase locking

Ans. (d) : Two-phase locking (2PL) is concurrency control method that ensure the integrity of data by ensuring that transactions lock the date they need in two distinct phase (growing and shrinking) to avoid conflicts. This helps prevent issues such as dirty reads, lost updates, and other anomalies that can occur in a concurrent transaction environment.

23. In transaction, cascade rollback

(a) Can occur in systems which use deferred write back
(b) Can occur in systems which use immediate write back
(c) Occurs in system which use the "Waterfall" transaction management system
(d) Is a result of simultaneous transaction commits

Ans. (b) : In transaction, cascade rollback can occur in systems which use immediately writeback. Immediate writeback means changes are written to the database immediately. If a transaction fails or is rolled back, any other transactions that depend on the results of this transaction may also need to be rolled back, leading to a cascading effect.

24. Given a relation country (name, continent, population) which of the following is a valid SQL statement?

(a) SELECT continent, population FROM country GROUP by Continent
(b) SELECT continent, SUM (population) FROM country GROUP by continent
(c) SELECT name, SUM (population) FROM country GROUP BY continent
(d) SELECT name, SUM (population) FROM country GROUP by continent

Ans. (b) : 'SELECT continent, SUM (population) FROM country GROUP by continent'. This statement is valid. Here, 'Continent' is in the GROUP BY' clause, and 'SUM (population)' is an aggregate function, which makes this query correctly structured.

25. An athletics meeting involves several competitions who participate in a number of events. The database is intended to record who is to take part in which event and to record the outcome of each event. As results become available the winner attribute will be updated with the cid of the appropriate competitor.
Competitor (cid, name nationality)
Event (eid, description, winner)
Competes (cid, eid)

Competitor

cid	name	nationality
01	Pat	British
02	Hilary	British
03	Sven	Swedish
04	Pierre	French

Event

eid	description	winner
01	running	
02	jumping	
03	throwing	

Competes

cid	eid
01	01
02	01
03	02
04	02
04	03

Select the true statement:

(a) There is a British competitor in every event
(b) Pierre does not compete in any event
(c) Sven has been entered in two events
(d) Hilary has entered only the running event

Ans. (d) : 'Hilary has entered only the running event : This statement is true. Here, Hilary (Cid 02) is listed in the competes table for event (02, 01), which is running.

26. An athletics meeting involves several competitors who participate in number of events. The database is intended to record who is take part in which event and two record the outcome of each event. As results become available the winner attribute will be updated with the cid of the appropriate competitor. the winner attribute will be updated with the cid of the appropriate competitor.
Competitor (cid, name, nationality)
Event (eid, description, winner)
Competes (cid, eid)

Competitor

cid	name	nationality
01	Pat	British
02	Hilary	British
03	Sven	Swedish
04	Pierre	French

Event

eid	description	winner
01	running	
02	jumping	
03	throwing	

Competes

cid	eid
01	01
02	01
03	02
04	02
04	03

Identify the result of the following SQL statement:
SELECT eid FROM Competes, Competitor

WHERE Competes cid = Competitor. cid
AND nationality = 'Swedish'

(a) 01 (b) 02
(c) 03 (d) 04

Ans. (b) : To determine the result of the SQL statement, From the competitor table, the only competitor with nationality 'Swedish' is Sven (Cid = 03). Find all 'eid' values in competes table where 'Cid' is 03 (Sven's 'Cid').
Looking at the competes table, Sven (cid = 03) is associated with–
(03, 02) : Sven competes in Jumping (eid = 02)
Thus, the query will return the 'eid' value for the event Sven is competing in, which is eid = 02.

27. Relation C is a projection of relation A. Which of the following statements must be true in all cases where relation C is different from relation A?

(a) The cardinality of C is greater than the cardinality of A
(b) The cardinality of C is less than the cardinality of A
(c) The arity of C is greater than the arity of A
(d) The arity of C is less than the arity of A

Ans. (d) : 'The arity of C is less than the arity of A : This statement must be true in all cases where relation C is different from relation A. By definition, projection involves selecting fewer columns, so the number of columns (arity) in C is less than in A.

28. When the referential integrity rule is enforced, which one is usually not a valid action in response to the deletion of a row that contains a primary key value referenced elsewhere?

(a) Do not allow the deletion
(b) Accept the deletion without any other action
(c) Delete the related row
(d) Set the foreign key of related row to null

Ans. (b) : When the referential integrity rule is enforced, the action that is usually not valid in response to the deletion of a row containing a primary key value referenced elsewhere is accept the deletion without any other action. Allowing the deletion without any other action would leave orphaned foreign keys, Violating referential integrity.

29. When an equi-join is performed on a table of N rows a table of M rows, the resulting table has the following number of rows:

(a) M
(b) N
(c) The smaller of M or N
(d) A number in the range 0 to M*N

Ans. (d) : An equi-join combines rows from two tables based on a specified condition, usually equality of certain columns. The resulting number of rows can vary depending or now many matches there are between the tables. In the worst case, every row in the first table matches with every row in the second table, leading to M*N rows. In the best case, there may be no matches at all, resulting in O rows.

30. In an SQL query that gets it data from two tables, and where the keywords WHERE, GROUP, ORDER, and HAVING appear, which operation is performed before the other ones?

(a) Restriction on WHERE conditions
(b) Restrictions on HAVING conditions
(c) ORDER BY
(d) Sort on GROUP BY

Ans. (a) : The operation that is performed first in an SQL query with the keywords WHERE, GROUP, ORDER, and HAVING is 'Restriction on WHERE conditions'.
The sequence of operations in an SQL query typically follows this order–
(I) FROM
(II) WHERE
(III) GROUP BY
(IV) HAVING
(V) SELECT
(VI) ORDER BY

31. A Trigger is

(a) A statement that enables to start nay DBMS
(b) A statement that is executed by the user when debugging a application program
(c) A condition the system tests for the validity of the database user
(d) A statement that is executed automatically by the system as a side effect of modification to the database.

Ans. (d) : Triggers are special procedures in database management system (DBMS) that automatically execute in response to certain events on a particular table or view, such as insertions, updates or deletions.

32. With regard to the expressive power of the formal relation Query Languages which of the following statements is TRUE?

(a) Relational algebra is more powerful than relational calculus.
(b) Relational algebra has the same power as relational calculus.
(c) Relational algebra has the same power as safe relational calculus.
(d) None of these

Ans. (c) : The most accurate statement regarding the expressive power of formal relational query languages is relational algebra has the same power as safe relational calculus. This means that every query that can be expressed in relational algebra can also be expressed in safe relational calculus, and vice versa.

33. In SQL, relation can contain null values, and comparisons with null values are treated as unknown suppose all comparisons with a null value are treated as false.
Which of the following pairs is not equivalent?

(a) x = 5 not (not (x = 5))
(b) x = 5 x > 4 and x < 6, where x is an integer
(c) x ≠ 5 not (x = 5)
(d) none of these

Ans. (c) : According to given question, comparison with NULL value always False, So, 'X ≠ 5' will be false. 'x = 5' will also false and
not (x = 5) = not (false) = true.
Hence, these are not equivalent pair.

34. The SQL expression
Select distinct T. branch name from branch T, branch S where T.
assets > S. assets and S branch city = "XYZ"
Finds the names of
(a) All branches that have greater assets than some branch located in XYZ
(b) All branches that have greater assets than all branches located in XYZ
(c) The branch that has the greatest asset in XYZ
(d) Any branch that has greater asset than any branch located in XYZ

Ans. (a) : The SQL query–
SELECT DISTINCT T. branch name
FROM branch T, branch S
WHERE T. assets > S. assets
AND S. branch city = "XYZ"
This query finds the names of all branches ('T. branch name') that have greater assets (T. assets) than some branch located in 'XYZ' (S. branch city = "XYZ").

35. Let R = (A, B, C, D, E, F) be a relation scheme with the following dependencies.
C → F, E → A, EC → D, A → B
Which of the following is a key for R?
(a) CD (b) EC
(c) AE (d) AC

Ans. (b) : To find a key for relation scheme R, we need to identify a minimal set of attributes that uniquely determine all other attributes in the relation.
Given the dependencies–
C → F
E → A
EC → D
A → B
We can start with attribute sets, and check if they satisfy the closure property to include all attributes.
Now, Let's try {E, C} :
$\{E, C\}^+ = \{C, E, A, F\}$
(From (C→ and E→A)
It includes all attributes, so {E, C} is a candidate key. We can verify that no subset of {E, C} uniquely determines all attributes. Hence, {E, C} is the key for relation scheme R.

36. Consider the schema R = (S T U V) and the dependencies S → T, T→ U, U → V and V → S. Let R = (R1 and R2) be a decomposition such that R1 ∩ R2 = ϕ. The decomposition is
(a) not in 2 NF
(b) in 2 NF but not in 3 NF
(c) in 3 NF but not in 2 NF
(d) in both 2 NF and 3 NF

Ans. (d) : Given the scheme R = (S, T, U, V) and the dependencies S → T, T → U, U → V, and V → S, every attribute determines every other attribute, meaning all attributes are part of a candidate key.
2NF : Since all attributes are prime attributes, there are no partial dependencies. Therefore, R is in 2NF.
3NF : Since all attributes are prime, any dependency X → Y has Y as a prime attribute. Thus, R satisfies 3NF.
Even with a decomposition where R1^R2 = ϕ, the original scheme R is in both 2NF and 3NF because of the nature of its dependencies.

37. A functional dependency of the form x → y is trivial if
(a) y ⊆ x (b) y ⊂ x
(c) x ⊆ y (d) x ⊂ y and y ⊂ x

Ans. (a) : A functional dependency X→Y is considered trivial if the set of attributes on the right-hand side (Y) is a subset of the attributes on the left-hand side (X). In other words.
X→Y is trivial if y ⊆ x.

38. Given the functional dependencies.
x → w; x → y; y → z and z → pq
which of the following does not hold good?
(a) x → z (b) w → z
(c) x → wy (d) None of these

Ans. (b) : Given the functional dependencies–
X→W
X→Y
Y→Z
Z→pq
So, we have X → W, but there is no direct dependency from W to Z or any other way to derive W → Z from the given dependencies. Thus, the W→Z does not hold.

39. Consider Join of a relation R with a relation S. If R has m tuples and S has n tuples, then maximum and minimum sizes of the Join respectively are
(a) m + n and 0 (b) m n and 0
(c) m + n and |m – n| (d) m n and m + n

Ans. (b) : In a relational database, when joining two relations R and S, the sizes of the join can be analyzed as follows :
Maximum Size : If R has m tuples and S has no tuples, then the maximum number of tuples in the join is m × n. This is known as a Cartesian product.
Minimum Size : The minimum number of tuples in the join is O. This occurs when there are no matching tuples between R and S based on the join condition.
Therefore, the correct answer is m × n and O.

40. For two union compatible relations R_1 (A, B) and R_2 (C, D), what is the result of the operation R_1 A = C AB = D R_2?
(a) $R_1 \cup R_2$ (b) $R_1 \times R_2$
(c) $R_1 - R_2$ (d) $R_1 \cap R_2$

Ans. (*) : Given two R union compatible relation R_1 (A, B) and R_2 (C, D). The result of the operation $R_1 \times (A = CAB = D) R_2$.
Here, we have two relations R_1 (A, B) and R_2 (C, D) and in condition we mentioned that first column of R_1 is equal to the first column of R_2, means we are checking equal to condition and here also we have 'AND' operator and it is represent intersection. So, option (d) $R_1 \cap R_2$ is the correct.

Note : Due to typing mistake in this question, RPSC has deleted this question.

41. A primary key, if combined with a foreign key creates
(a) Parent child relationship between the tables that connect them.
(b) Many-to- many relationship between the tables that connect them
(c) Network model between the tables connect them
(d) None of these

Ans. (a) : In a database, a primary key in one table can be referenced as a foreign key in another table to establish a parent-child relationship. This means that the table with the primary key is the parent, and the table with the foreign key is the child, linking rows in the child table to specific rows in the parent table.

42. The employee's salary should not be more than Rs. 6000. This is
(a) Integrity constraint
(b) Referential constraint
(c) Over-defined constraint
(d) Feasible constraint

Ans. (a) : The statement 'The employee's salary should not be more than Rs. 6000" is an example of an integrity constraint. This type of constraint is used to ensure the accuracy and consistency of data within a database.

43. A relational model which allows non-atomic domains is
(a) Nested relational data model
(b) Non-atomic data model
(c) Hierarchical data model
(d) None of these

Ans. (a) : The nested relational data model allows the use of non-atomic (or complex) data types, such as sets, lists or even entire relations as attributes, enabling the representation of hierarchical or nested structures within a relational framework.

44. If adjacency relation of vertices in a graph is represented in a table Adj (x, y), then which of the following Queries cannot be expressed by a relational
(a) List all vertices adjacent to given vertex
(b) List all vertices which have self-loops
(c) List all vertices which belong to cycle of less than three verities
(d) List all vertices reachable from a given vertex

Ans. (d) : To determine reach ability, one might need to consider paths of arbitrary length, as a vertex might be reachable through a sequence of edges. This requires recursive processing, which cannot be done with a fixed-length relational algebra expression because relational algebra does not inherently support recursion or interactive computation over an arbitrary number of steps. Therefore, the query that cannot be expressed by a relational algebra expression of constant length is list all vertices reachable from a given vertex.

45. Which of the following is true of the data manipulation language (DML)?
(a) It refers to data using physical addresses
(b) It cannot interface with high-level programming language
(c) It is used to define the physical characteristics of each record
(d) None of these

Ans. (d) : Data Manipulation Language (DML) is a part of SQL, used for managing and manipulating data within a database. It include commands like 'SELECT', 'INSERT', 'UPDATE', and 'DELETE', which are used to retrieve and modify data.

46. Using relational algebra, the query that finds customers, who have a balance of over 3000 is
(a) $\pi_{customer\_name}(\sigma_{balance > 3000}(Deposit))$
(b) $\sigma_{customer\_name}(\sigma_{balance > 3000}(Deposit))$
(c) $\pi_{customer\_name}(\sigma_{balance > 3000}(Borrow))$
(d) $\pi_{customer\_name}(\pi_{balance > 3000}(Borrow))$

Ans. (a) : The correct relational algebra expression to find customers who have a balance of over 3000 is π customer_name (σ balance > 3000 (Deposit)). This expression uses the selection operator (σ) to filter records in the 'Deposit' relation where the balance is greater than 3000. Then, it uses the projection operator (π) to extract the 'customer_name' attribute from those filtered records.

47. Embedded pointer provides a/an
(a) Secondary access path
(b) Physical record key
(c) Inverted index
(d) All of these

Ans. (a) : Embedded pointer is used to create a reference or link to another record, providing an alternative way to access data, which is characteristic of a secondary access path. It does not directly correspond to a physical record key or an inverted index, though these can be part of a system that uses secondary access paths.

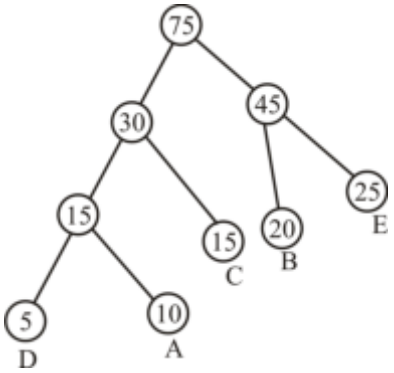
48. The physical locations of a record is determined by a mathematical formula that transforms file key into a record location in a/an
(a) B-tree file (b) Indexed file
(c) Hashed file (d) All these

Ans. (c) : In a hashed file, a mathematical formula (hash function) is used to transform the file key into a specific record location. This allows for direct access to the data.

49. Minimum number of record movements required to merge five files A (with 10 records), B (with 20 records), C (with 15 records), D (with 5 records) and E (with 25 records) is

(a) 165 (b) 90
(c) 75 (d) 65

Ans. (*) : To solve this problem, we can use a priority queue (or min-heap) approach, which is efficient for merging files optimally.



Now, minimum number of record movements required = Sum of internal node's value

= 15 + 30 + 45 + 75

= 165

Note- RPSC has considered option (d) 65 as correct.

50. Which command allows us to add to our database file?

(a) CLEAR (b) CREATE
(c) APPEND (d) APPEND BLANK

Ans. (*) : To add new records to a database you use an append query, and to delete whole records from a database you use a delete query.

Note–RPSC has deleted this question.

51. Which of the following commands permanently delete the record marked for deletion from the date bases field?

(a) PACK (b) ZAP
(c) SEEK (d) SKIP

Ans. (a) : The 'PACK' command is used to remove all records that have been marked for deletion from the database permanently. Whereas 'ZAP' command deletes all records in the database, 'SEEK' command is used to search for a specific record in the database, and 'SKIP' command is used to move the record pointer to the next record.

52. A relational database which is in 3NF may still have undesirable data redundancy because there may exist

(a) Transitive functional dependencies
(b) Non-trivial functional dependencies involving prime attributes and the right side
(c) Non-trivial functional dependencies involving prime attributes only on the left side.
(d) Trivial functional dependencies involving number of attributes

Ans. (b) : In a 3NF relational database, undesirable data redundancy can still exist due to non-trival functional dependencies involving prime attributes and the right side. 3NF allows functional dependencies where a prime attribute determines another attributes. If these dependencies are non-trival and involve prime attributes. They can lead to redundancy. This issue is typically resolved in Boyce-Codd Normal Form (BCNF), which has stricter requirement to eliminate such redundancies.

53. Data security threats include

(a) Privacy invasion
(b) Hardware failure
(c) Fraudulent manipulation of data
(d) All of these

Ans. (a) : Data security threats refer to potential risks or attacks that can compromise the confidentiality, integrity, and availability of data. These threats can come from various sources, including Privacy invasion.

54. Which of the following queries finds the clients of banker xyz and the city they live in?

(a) $\pi_{\text{client.customer\_name.customer city}}(\sigma_{\text{client .customers- name = customer. customer \_name}}(\sigma_{\text{Banker \_name = "xyz"}}(\text{Client} \times \text{Customer})))$

(b) $\pi_{\text{customer \_ name.customer \_ city}}(\sigma_{\text{Banker\_name = "xyz"}}(\text{Client} \times \text{Customer}))$

(c) $\pi_{\text{client.customer\_name.customer city}}(\sigma_{\text{Banker\_name = "xyz"}}(\sigma_{\text{client .customers- name = customer. customer \_name}}(\text{Client} \times \text{Customer})))$

(d) $\pi_{\text{client.customer\_name.customer city}}(\sigma_{\text{Banker\_name = "xyz"}}(\text{Client} \times \text{Customer}))$

Ans. (*) : Due to typing mistake RPSC has deleted this question.

55. If P and Q are predicates and P is the relational algebra expression, then which of the following equivalence are valid?

(a) $(\sigma_P(\sigma_Q(e)) = \sigma_Q(\sigma_P(e)))$
(b) $(\sigma_P(\sigma_P(e)) = \sigma_P(e))$
(c) $(\sigma_P(\sigma_P(e)) = \sigma_{P \cup Q}(e))$
(d) None of these

Ans. (*) : Due to typing mistake RPSC has deleted this question.

56. Find the correct match for terms in Column I to those in Column II.

Column I		Column II	
A.	**Roll back**	**P**	**Relationship**
B.	**Atomicity**	**Q**	**Checkpoint**
C.	**Entity**	**R**	**Attribute**
D.	**Domain**	**S**	**Transaction**

(a) A-S, B-P, C-R, D-Q (b) A-Q, B-S, C-P, D-R
(c) A-S, B-Q, C-R, D-P (d) A-Q, B-P, C-R, D-S

Ans. (b) : Correct Match–

Column I	Column II
A. Roll back	Q. Checkpoint
B. Atomicity	S. Transaction
C. Entity	P. Relationship
D. Domain	R. Attribute

57. Consider a weak entity set W and its identifying (owner) entity set O. Primary key of W is composed of

(a) Discriminator of W and primary key of O
(b) Super key of W and Primary key of O
(c) Discriminator of W and foreign key of O
(d) Super key of W and foreign key of O

Ans. (a) : The primary key of a weak entity set W is composed of Discriminator of W and primary key of O. This is because a weak entity set depends on a strong (owner) entity set O for its identification. The primary key of W combines the discriminator (or partial key) of W with the primary key of the owner entity set O. This combination ensures that the weak entity set's instances are uniquely identified in conjunction with its owing entity.

58. Which of the following is an assertion in DBMS?

(a) Domain (b) Generalization
(c) Trigger (d) View

Ans. (a) : In DBMS the term 'assertion' refers to a condition that must always hold true for the database. Among the given options, the closest to an assertion is Domain constraint. A domain constraint specifies the permissible values for a given attribute.

59. Find the correct match for terms in Column I to those in Column II:

Column I		Column II	
A.	**Audit Trail**	**P**	**Tuple**
B.	**Row**	**Q**	**Privileges**
C.	**Revoke**	**R**	**Event-Condition-Action**
D.	**Trigger**	**S**	**Security**

(a) A-S, B-P, C-R, D-Q
(b) A-P, B-S, C-Q, D-R
(c) A-S, B-Q, C-R, D-P
(d) A-S, B-P, C-Q, D-R

Ans. (d) : Correct Match–

Column I	Column II
A. Audit Rail	S. Security
B. Row	P. Tuple
C. Revoke	Q. Privileges
D. Trigger	R. Event-condition-Action

60. Consider the statement, "Either $-2 \le x < -1$ or $1 \le x \le 2$". The negation of this statement is

(a) $x < -2$ or $2 \le x$ or $-1 < x < 1$
(b) $x < -2$ or $2 < x$ or $-1 \le x < 1$
(c) $x \le -2$ or $2 < x$ or $-1 \le x < 1$
(d) None of these

Ans. (b) : Given statement,
Either $-2 \le x \angle -1$ or $1 \le x \le 2$.
i.e. Either $x \ge -2$ or $x \le -1$ or $1 \le x$ or $x \le 2$
We have to find negation of above statement :
Negation of $x \ge -2$ is $x < 2$.
Negation of $1 \le -1$ is $x > -1$.
Negation of $x \le x$ is $x < 1$.
Negation of $x \le 2$ is $x > 2$.
i.e. $x < -2$ or $2 < x$ or $-1 \le x < 1$
So, option (b) is correct.

61. Let A = {0, 1} × {0, 1} × {0, 1} and B = {a, b, c} × {a, b, c} × {a, b, c}. Suppose A is listed in lexicographic order based on 0 < 1 and B is listed in lexicographic order based on a < b < c. If A × B × A is listed in lexicographic order, then the next element after ((1, 0, 0), c, c, c), (1, 1, 1))) is

(a) ((1, 0, 1), (a, a, b), (0, 0, 0))
(b) ((1, 0, 1), (b, a, a), (0, 0, 1))
(c) ((1, 0, 1), (a, a, a), (0, 0, 0))
(d) ((1, 0, 0), (a, a, b), (0, 0, 0))

Ans. (c) : The next element after ((1, 0, (0), (c, c, c), (1, 1, 1)) in lexicographic order is [(1, 0, 1), (1, 1, 1), (0, 0, 0)). This is because the sequence increments in the last tuple of A, but since that's already at its maximum, it rolls over to increment the second-t-lost tuple of A and resets B and the last tuple of A to their lowest values.

62. Which normal form is considered adequate for database design?

(a) 2NF (b) 3NF
(c) 4NF (d) 5NF

Ans. (b) : For mast practical database design purposes, 3NF (Third Normal Form) is generally considered adequate. It ensures that the data-base scheme is free from transitive dependencies which helps in reducing redundancy and improving data integrity. While 4NF and 5NF address more specific types of anomalies, 3NF is usually sufficient for most use cases.

63. Which of the following statement is FALSE?

(a) $\{2, 3, 4\} \in A$ and $\{2, 3\} \in B$ implies that $\{4\} \subseteq A - B$
(b) $\{2, 3, 4\} \subseteq A$ implies that $2 \in A$ and $\{3, 4\} \subseteq A$
(c) $A \cap B \supseteq \{2, 3, 4\}$ implies that $\{2, 3, 4\} \subseteq A$ and $\{2, 3, 4\} \subseteq B$.
(d) $A - B \supseteq \{3, 4\}$ and $\{1, 2\} \subseteq B$ implies that $\{1, 2, 3, 4\} \subseteq A \cup B$

Ans. (*) : Due to typing mistake RPSC has deleted this question.

64. Find the correct match for terms in Column I to those in Column II:

Column -I	Column-II
A. topological sorting	**P. grant**
B. privileges	**Q. concurrency**
C. multivalued dependency	**R. 4NF**
D. improved throughput	**S. serializable order**

(a) A-P, B-Q, C-R, D-S
(b) A-SQ B-S, C-P, D-R
(c) A-S, B-Q, C-R, D-P
(d) A-S, B-P, C-R, D-Q

Ans. (d) : Correct match–

Column-I	Column-II
A. Topological sorting	S. Serializable order
B. Privileges	P. Grant
C. Multi-valued dependency	R. 4NF
D. Improved through put	Q. Concurrency

65. Two concurrent transactions T1 and T2 are in conflict when

(a) T1 reads from x, T2 reads from y
(b) T1 reads from x, T2 writes to x
(c) T1 writes to x, T2 writes to y
(d) T1 writes to x, T2 writes to y

Ans. (b) : Two concurrent transactions T1 and T2 are in conflict if they access the same data item and at least one of them is writing to that data item. The correct condition for conflict is TS reads from X, T2 writes to X.

66. Identify correct matching of the following sets:

A.	**Transaction**	**1.**	**index**
B.	**Natural join**	**2.**	**relational algebra**
C.	**B-tree**	**3.**	**two phase locking**
D.	**Concurrency control**	**4.**	**ACID**

(a) A-4, B-2, C-3, D-1
(b) A-4, B-1, C-3, D-2
(c) A-3, B-2, C-1, D-4
(d) A-4, B-2, C-1, D-3

Ans. (d) : Correct Match–

Column I	**Column II**
A. Transaction	4. ACID
B. Natural join	2. Relational algebra
C. B-tree	1. Index
D. Concurrency control	3. Two phase lacking

67. In context of the phase locking protocol, which of the following statements is correct?

(a) Growing phase occurs after shrinking phase.
(b) In shrinking phase, transaction can obtain as well as release locks but in growing phase, it can only obtain locks.
(c) In growing phase, transaction can obtain as well as release locks but in shrinking phase, it can only release locks.
(d) In growing phase, transaction, can only obtain locks and in shrinking phase, it can only release locks.

Ans. (d) : In the context of the two-phase locking (2PL) protocol, the correct statement is 'In the growing phase, transaction can only obtain locks and in shrinking phases it can only release locks.' This reflects the core principle of the 2PL protocol, where a transaction goes through a "growing phase" where it can acquire locks but cannot release them, followed by a "shrinking phase" where it can release locks but cannot acquire new ones.

68. Which one of the following is not related to Normal forms (Normalization) rule with regards to the Relational Model?

(a) All fields within a table must related to or directly describe the Primary key.
(b) Repeating Groups must be eliminated from tables
(c) Fields that can contain non-numeric data are to be removed and place within their own tables with an associated Primary key.
(d) Redundant data is to be eliminated by placing the offending fields in another table.

Ans. (c) : The statement that is not related to Normal Forms (Normalization) with regards to the Relational Mode is 'Fields that can contain non-numeric data are to be removed and placed within their own tables with an associated Primary key. Normalization in the context of the relational model is about organizing the fields and tables of a database to minimize redundancy and dependency. It does not specifically requrie separating fields based on whether they contain non-numeric data.

69. Which of the following SQL query shall output names of all customers ending with "Smith"?

(a) Select name from customer where name like '_Smith'
(b) Select name from customer where name like '%Smith'
(c) Select name from customer where name like' Smith%
(d) Select name from customer where name like '%Smith

Ans. (b) : The correct SQL query to output names of all customers ending with 'smith' is 'select name from customer where name like % smith'. This query uses the 'LIKE' operator with the Wildcard '%', which matches any sequence of characters before "smith".

70. Which of the following is correct?

(a) An SQL query automatically eliminates duplicates.
(b) An SQL query will not work if there are no indexes on the relations.
(c) SQL queries can be nested
(d) SQL permits attribute names to be repeated in the same relation.

Ans. (c) : Among the given options, the correct statement is SQL queries can be rested. SQL allows nesting of queries, meaning you can use a query inside another query.

71. 172.17 225.125 IP address belong to

(a) Public IP address (b) Private IP address
(c) Both (d) None

Ans. (b) : The IP address '172.17,225.125' belongs to Private IP address. The range '172.16.0.0' to '172.31.255.255' is designated for private use, so this IP falls within that range.

72. Wired Equivalent Privacy (WEP) and WiFi Protected Access (WPA) are examples of

(a) packet filtering services
(b) network address translation protocols.
(c) Security protocols
(d) Service set identifiers.

Ans. (c) : Wired Equivalent Privacy (WEP) and Wi-Fi, Protected Access (WPA) are examples of security protocols. They are used to secure wireless networks by providing encryption and authentication mechanisms.

73. Match the following acronyms to their definitions:

I	**HTTP**	**A**	**Protects IP addresses from hackers**
II	**SMTP**	**B.**	**A protocol associated with Web pages**
III	**NAT**	**C.**	**A protocol use for e-mail**
IV	**WAP**	**D.**	**an access point on a wireless network**

(a) I-B, II-A, III-D, IV-C
(b) I-B, II-C, III-A, IV-D
(c) I-C, II-A, III-D, IV-B
(d) I-C, II-D, III-A, IV-B

Ans. (b) : Correct match–
A. HTTP B. A protocol associated with web pages.
B. SMTP C. A protocol used for e-mail.
III. NAT A. Protects IP addresses from hackers
IV. WAP D. an access point on a wireless network.

74. In the p-persistent approach of CSMA protocol, when a station finds an idle line, it _____

(a) Waits 1 sec before sending
(b) Sends with probability 1– p
(c) Sends with probability p
(d) Sends immediately

Ans. (c) : In the p-persistent approach of CSMA (Carrier Sense Multiple Access), when a station finds an idle line, it sends with probability p. The probability p determines the likelihood that the station will attempt to send immediately. While with probability 1-p, the station will wait for a specified time before trying again. This approach balances between immediate transmission and deferring to avoid collisions.

75. You have a network ID of 131.107.0.0 and you need to divide it into multiple subnets. You need 600 host IDs for each subnet with the largest amount of subnets available. Which subnet mask should you assign.

(a) 255.255.224.0 (b) 255.255.240.0
(c) 255.255.248.0 (d) 255.255.252.0

Ans. (d) : To accommodate 600 hosts per subnet :
Calculate needed addresses are 602 (including network and broadcast).
Find subnet mask for 600 hasts, you need 10 host bits, which provides $21^{10} = 1024$ addresses.
So, Determine subnet mask–
An IPv4 address has 32 bits in total. If 10 bits are used for hosts, then 32–10 = 22 bits are used for the network portion. The subnet mask with 22 bits for the network portion is 255,255,252.0

76. What protocol is used to convert IP addresses to MAC addresses?

(a) IP (b) ARP
(c) RARP (d) ICMP

Ans. (b) : ARP stands for Address Resolution Protocol. It is network protocol used to map an IP address (a logical address) to physical machine address, also known as a MAC (Media Access Control) address, on a Local Area Network (LAN).

77. S system has an-layer protocol hierarchy. Applications generate messages of length M bytes. At each o the layers. An h-byte header is added What fractions of the network bandwidth is filled with headers?

(a) $\frac{h}{M}$ (b) $\frac{hn}{M+nh}$
(c) $\frac{nh}{M}$ (d) $1-\frac{nh}{M}$

Ans. (b) : Each application message is M bytes. Each of the n-layers adds an h-byte header. So, total header size = nh bytes
Total size of the message including headers = M+hh bytes
Fraction of bandwidth filled with headers
$= \frac{\text{Total header size}}{\text{Total size}} = \frac{hn}{M+nh}$

78. The ABC Corporation of XYZ has a fully connected mesh network consisting of 99 devices. Calculate the number of port for each device.

(a) 4950 (b) 4851
(c) 100 (d) 98

Ans. (d) : In a fully connected mesh networks every device is connected to every other device. If there are n devices, each device needs n-1 ports to connect to the other devices. Given that there are 99 devices in the network. So, each device would need 99–1=98 parts.

79. FDDI is a

(a) Ring network
(b) Star network
(c) Mesh network
(d) Bus based network

Ans. (a) : FDDI (Fiber Distributed Data Interface) is a Ring Network. FDDI primarily uses a dual-ring architecture, which is a type of ring network, for data transmission.

80. In networking terminology UTP means

(a) Unshielded Twisted pair
(b) Unshielded Teflon port
(c) Uniformly terminating port
(d) Unshielded T-connector port

Ans. (a) : In networking terminology, UTP stands for unshielded Twisted Pair. It is a type of cable used in networking and telecommunications. It consists of pairs of wires twisted together to reduce electro magnetic interference (EMI) and crosstalk from adjacent wires.

81. Four bits are used for packed sequence numbering in a sliding window protocol used in a computer network. What is the maximum window size?

(a) 4 (b) 8
(c) 15 (d) 16

Ans. (d) : With 4 bits used for packed sequence numbering, the maximum possible sequence number is indeed $2^4 = 16$. This means the window size can be up to 16, allowing the receiver to accept up to 16 packets before sending an acknowlegement.

82. IP address can be used to specify a broadcast and map to hardware broadcast if available. By conversion broadcast address has hosted with all bits

(a) 0 (b) 1
(c) Both (1) and (2) (d) None of these

Ans. (b) : In the context of IP addresses and broadcasts, the broadcast address is obtained by setting all host bits to 1. This means that for a given network, the broadcast address is the address where all the bits in the host portion are set to 1.

83. ICMP (internet control message protocol) is

(a) A protocol that handles error and control messages
(b) A protocol used to monitor computers
(c) Both (1) and (2)
(d) None of these

Ans. (a) : ICMP (Internet Control Message Protocol) is used to send error messages and operational information indicating success or failure when communicating with another IP address, while it can be used in monitoring (such as with Tools like 'ping'). So, it is a protocol that handles error and control messages.

84. Error detection at the date link level is achieved by

(a) Bit stuffing
(b) Cyclic redundancy codes
(c) Hamming codes
(d) Equalization

Ans. (b) : Error detection at the data link level is typically achieved using Cyclic Redundancy Codes (CRC), which is a type of error-detecting code that calculates a checksum for a block of data. The sender calculates the CRC and appends it to the data, and the receiver recalculates the CRC and compares it to the transmitted CRC to detect errors.

85. The topology with highest reliability is

(a) By topology (b) Star topology
(c) Ring topology (d) Mesh topology

Ans. (d) : The topology with the highest reliability is typically the mesh topology. In a mesh topology each device is connected to every other device, providing multiple paths for data to travel. This redundancy makes the network highly reliable because if one connection fails, there are alternative routes for data to reach its destination.

86. How many characters per sec (7 bits + 1 parity) can be transmitted over a 2400 bps line if the transfer is synchronous (1 start and 1 stop bit)?

(a) 300 (b) 240
(c) 250 (d) 275

Ans. (a) : The transmission rate is 2400 bps. Each character has 7 data bits. 1 parity bit, but no start and stop bits (since it's synchronous transmission). So, each character has 8 bits.

To find the characters per second, divide the transmission rate by the number of bits per character

$$= \frac{2400 \text{ bps}}{8 \text{ bits/character}}$$

= 300 characters per second.

87. In Ethernet CSMS/CD, the special bit sequence transmitted by media access management collision heading is called

(a) Preamble (b) Postamble
(c) Jam (d) None of these

Ans. (c) : In Ethernet CSMA/CD (Carrier Sense Multiple Access/Collision Detection), the special bit sequence transmitted by media access management collision handling is called a Jam. The Jam signal is used to ensure that all network devices recognize the collision and back off appropriately.

88. A terminal multiplexer has six 1200 bps terminals and 'n' 300 bps terminals connected to it. If outgoing line is 96000 bps, then maximum value of n is

(a) 4 (b) 16
(c) 8 (d) 28

Ans. (c) : To find the maximum number of 300 bps terminals (n) that can be connected without exceeding the 9600 bps line capacity.

Total data rate for six 1200 bps terminals = 6×1200
= 7200 bps

Remaining capacity for 300 bps terminals
= 9600–7200 = 2400 bps

Maximum number of 300 bps terminals $= \frac{2400}{300} = 8$

Thus, the maximum value of n is 8.

89. In time division switches, if each memory access takes 100 ms and one frame period is 125 ms, then maximum number of lines that can be supported is

(a) 625 (b) 1250
(c) 2300 (d) 318

Ans. (*) : Given ;

Memory access time = 100 microseconds (μs)

Frame period = 125 milliseconds (ms)
= 125000 microseconds
$(\because 1\text{ms} = 1000\ \mu\text{s})$

$$\text{Numbers lines} = \frac{\text{Frame period}}{\text{memory access time}}$$

$$= \frac{125000\mu s}{100\mu s} = 1250$$

Thus, the correct option (b) 1250

Note–RPSC deleted this question.

90. If data rate of ring is 20Mbps, signal propagation speed is 200 b/ms, then number of bits that can be placed on the channel of 200 km is

(a) 2000 bits (b) 20,000 bits
(c) 1000 bits (d) None of these