D–2490	Sub. Code
	31514

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

First Semester

DISCRETE MATHEMATICS

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Prove that the $(\neg P \to (P \to Q))$ is a tautology.

2. How many elements in power set of a set A?

3. If $S = \{1, 2, \ldots, 10\}$ and a relation $R = \{(x, y) | x + y = 10\}$ on S, then write the elements of R.

4. When do you say that a relation is a partial order relation?

5. Verify that $f : Z \to Z$ defined by $f(x) = x^2$ is one to one function or not.

6. If $\psi_A(x) = 1$ for all $x \in A \subset U$, then what is A?

7. If $a * b = (a + b)/2$, $a, b \in R$, find the identity element of R.

8. Define zero divisors of a Ring R.

9. What is simple graph?

10. What is the probability of getting a vowel from English alphabets?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Determine the principal disjunctive normal form of $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$.

Or

(b) Derive $P \rightarrow (Q \rightarrow S)$, using the rule CP from $P \rightarrow (Q \rightarrow R), Q \rightarrow (R \rightarrow S)$.

12. (a) Let $A = \{a, b, c, d\}$, $B = \{1, 2, 3, 4, 5, 6\}$ and R = $(a, 1)$, $(a, 3)$, $(a, 5)$, $(b, 2)$, $(b, 4)$, $(b, 6)$, $(c, 1)$, $(c, 2)$, $(c, 3)$, $(c, 6)$, $(d, 2)$, $(d, 4)$, $(d, 5)$ then write the matrix of R and matrix of inverse of R.

Or

(b) Prove that if R and S are equivalence relation on X, then their intersection $R \cap S$ is an equivalence relation.

13. (a) Prove that a function $f = R \rightarrow R$ defined by $f(x) = 2x - 3$ is a bijective function.

Or

(b) Let A and B be any two subsets of a universal set U. Prove that $\psi_A^C(x) = 1 - \psi_A(x)$.

14. (a) Let $(R, *)$ be a semi group where R is the set of all real number and * is the binary operation on * defined by $a * b = a + b + 3ab$. Prove that $(R, *)$ is a monoid.

Or

(b) If $f : G \to G$ is a group homomorphism, $Ker(f) = \{x \in G \mid f(x) = e'\}$ where e' is the identity element of G', then prove that Ker(f) is a normal subgroup of G.

15. (a) In a graph G, prove that, the sum of the degrees of the vertices is equal to twice the number of edges.

Or

(b) Let A be the event of getting an odd number and B be the event of getting a prime number in a single throw of a die. What will be the probability that it is either an odd number or a prime number?

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Show that the premises "A student in this class has not read the book", and "Everyone in this class passed the first exam" imply the conclusion "Someone who passed the first exam has not read the book".

17. Let $D_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$ and let the relation R be divisor on D_{30}.

(a) Draw the Hasse diagram.

(b) Find all the lower bound of 10 and 15

(c) Find the GLB of 10 and 15

(d) Find all upper bound of 10 and 15

(e) Find the LUB of 10 and 15.

18. Let $f(x)=x+2$, $g(x)=x-2$ and $h(x)=3x$ for $x \in R$, where R is the set of real numbers. Find $g \circ f$; $f \circ g$; $f \circ f$; $g \circ g$; $f \circ h$; $h \circ g$; $h \circ f$ and $f \circ h \circ g$.

19. State and prove Lagrange theorem on groups.

20. Three urns are there containing white and black balls; first urn has 3 white and 2 black balls, second urn has 2 white and 3 black balls and third urn has 4 white and 1 black balls. Without any biasing one urn is chosen from that one ball is chosen randomly which was white. What is probability that it came from the third urn?

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D–2491	Sub. Code
	31521

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Second Semester

ACCOUNTING AND FINANCIAL MANAGEMENT

(CBCS 2020 – 21 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define financial accounting

2. Write any two advantages of fund flow statement?

3. What is Marginal Costing?

4. Define Cost Accounting.

5. State any two objectives of Budgetary Control.

6. What is a cash budget?

7. What is capital budgeting?

8. Define Profit Maximization.

9. Define Cost of Debt (Kd).

10. List out the factors influencing dividend policy.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) The following balances are extracted from the books of Prabhu, as on 31st March, 2017. Prepare trial balance

Particulars	Rs.
Building	60,000
Machinery	17,000
Returns outward	2,600
Bad debts	2,000
Cash	400
Discount received	3,000
Bank overdraft	10,000
Creditors	50,000
Purchases	1,00,000
Capital	72,800
Fixtures	5,600
Sales	1,04,000
Debtors	60,000
Interest received	2,600

Or

(b) Explain the concepts and conventions of accounting

12. (a) Explain the various elements of cost.

Or

(b) Calculate P/V ratio, sales required to earn a profit of Rs.2,50,000 and profit at a sale of Rs.10,00,000.

Sales Rs.4,00,000

Variable cost Rs.2,00,000

Fixed cost Rs.50,000

13. (a) Bring out the importance of standard costing.

Or

(b) Explain the importance of production budget.

14. (a) Discuss the functions of financial management.

Or

(b) Explain the components of working capital.

15. (a) Discuss the classifications of cost of capital.

Or

(b) State the factors influencing dividend policy.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Prepare trading and profit and loss account and balance sheet in the books of Deri, a trader, from the following balances as on March 31, 2018.

Particulars	Rs.	Particulars	Rs.
Stock	10,000	Sales	1,22,500
Cash	2,500	Creditors	5,000
Bank	5,000	Bills payable	2,000
Freight inwards	750	Capital	1,00,000
Purchases	95,000		
Drawings	4,500		
Wages	27,500		
Machinery	50,000		
Debtors	13,500		
Postage (office)	150		
Sundry expenses	850		
Rent paid	2,500		
Furniture	17,250		
	2,29,500		2,29,500

Closing stock (31st March, 2018) Rs. 8,000.

17. The following data have been extracted from the books of M/s Moonshine Industries Ltd., for the calendar year 1981.

Op. stock of raw material	25,000	Salary-Office	2,500
Purchases of raw material	85,000	Salesmen	2,000
Closing stock of raw material	40,000	Other factory expenses	5,700
Carriage inward	5,000	Other office expenses	900
Wages-Direct	75,000	Managing Director's remuneration	12,000
Wages-Indirect	10,000	Other selling expenses	1,000
Other Direct charges	15,000	Travelling expenses of Salesmen	1,100
Rent and Rates - factory	5,000	Carriage and Freight Outward	1,000
Rent and Rates - office	500	Sales	2,50,000
Indirect consumption of material	500	Advance Income Tax paid	15,000
Depreciation - Plant etc.	1,500	Advertisement	2,000
Office Furniture	100		

Managing Director's remuneration is to be allocated Rs. 4,000 to factory Rs. 2,000 to the office and Rs. 6,000 to selling departments. From the above information prepare (a) Prime cost, (b) Works cost, (c) Cost of production, (d) Cost of sales, (e) Net Profit.

18. Discuss the various types of budget.

19. Determine the factors affecting working capital.

20. Explain the theories of capital structure.

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	31524

DISTANCE EDUCATION

M.C.A DEGREE EXAMINATION, MAY 2026.

Second Semester

VISUAL PROGRAMMING WITH .NET

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. State the purpose of the status Bar in visual Studio.

2. What is the role of Visual Studio Explorer?

3. What is the purpose of the using directive in C#?

4. Why is the Program class important in a C# console application?

5. What is the AssemblyName property used for?

6. Define a delegate in C#.

7. How does the Immediate Window help during debugging?

8. Define the role of Server Explorer in Visual Studio.

9. What is the purpose of WPF in desktop application development?

10. Why is a ComboBox used in WPF applications?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Differentiate between Windows Projects and Web Projects in Visual Studio.

Or

(b) Illustrate the key components of the Work Area in Visual Studio.

12. (a) Explain the purpose of the Main method in a C# program.

Or

(b) Describe the purpose of bookmarks in the VS Code editor.

13. (a) Explain the definition of a delegate and its purpose.

Or

(b) Describe the features of the solution Explorer and its importance in project management.

14. (a) Describe how the Watch Window and Quick Watch Window are used in Visual Studio

Or

(b) Explain how tables can be related using foreign keys.

15. (a) Describe the difference between DockPanel and WrapPanel lauots.

Or

(b) Discuss the role of Silverlight applications in web development

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain in detail the components of the Visual Studio interface: Menu Toolbar, Work Area, Toolbox, Status Bar and Explorer.

17. Compare and contrast for and while loops with suitable example program.

18. Describe the different output types available when building a project in Visual Studio.

19. Explain in detail the debugging methods available in Visual Studio, including breakpoints, stepping and variable inspection.

20. Discuss the importance of DataGrid in WPF for reading and saving data with an example.

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	31531

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Third Semester

SOFTWARE ENGINEERING

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define CMMI.

2. What is process models?

3. State the object oriented analysis.

4. Define scenario-based model.

5. What do you mean by design engineering?

6. State the design evaluation.

7. What is white box testing?

8. Define validation testing.

9. What is risk projection?

10. Define software reviews.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain about the layered technology?

Or

(b) Describe about the process assessment.

12. (a) Elucidate the requirement engineering process.

Or

(b) Elaborate the class based modeling.

13. (a) Give an account on software architecture?

Or

(b) Write note on interface design steps?

14. (a) Describe about the integration testing.

Or

(b) Write notes on software quality.

15. (a) State the monitoring and management?

Or

(b) Given an account on formal technical reviews?

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Differentiate between waterfall and incremental process models.

17. Elucidate the data modeling concepts?

18. Apply data design concepts to an e-commerce system?

19. Interpret the significance of debugging in software testing.

20. Explain the difference between proactive and reactive risk strategies.

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31533

DISTANCE EDUCATION

M.C.A DEGREE EXAMINATION, MAY 2026.

Third Semester

INTERNET AND JAVA PROGRAMMING

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is DNS?

2. List any three popular web browsers.

3. Define object oriented programming.

4. What is JVM?

5. List the types of inheritance supported in Java.

6. What are wrapper classes?

7. Define the thread synchronization?

8. What is an exception in Java?

9. What is difference between byte stream and character stream?

10. List I/O classes in Java.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Show how to configure an email client.

Or

(b) Evaluate the effectiveness of search engines in information retrieval.

12. (a) Explain how Java differs from C and C++.

Or

(b) Compare relational, logical and bit wise operators.

13. (a) Demonstrate method overriding using inheritance.

Or

(b) Examine the structure of a package in java with example program.

14. (a) Demonstrate priority scheduling with threads.

Or

(b) Implement on apples to display user input.

15. (a) Compare byte stream classes with character stream classes.

Or

(b) Demonstrate writing bytes to a file using FileOutputStream.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Examine the advantages of IRC over modern messaging apps.

17. Write a note on different types of operators with details.

18. Write a Java program using wrapper classes to convert suing to integer.

19. Critique the role of applets in modern internet applications with example program.

20. Apply interactive input to read user data and write to file.

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31534

DISTANCE EDUCATION

M.C.A DEGREE EXAMINATION, MAY 2026.

Third Semester

COMPUTER NETWORKS

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define topology.

2. List the uses of WAN?

3. What is farming?

4. Define error detection and control.

5. What is packet switching?

6. State the virtual circuit subnet.

7. List the services provided by UDP.

8. What is SNMP?

9. List the types of substitution cipher?

10. Define symmetric key cryptography?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Differentiate between LAN, MAN and WAN.

Or

(b) Evaluate the effectiveness of fiber optic cables compared to copper cables.

12. (a) Illustrate how flow control prevents data overflow at the receiver side.

Or

(b) Show the CSMA/CD is used in Ethernet networks

13. (a) Analyze the limitation of message switching.

Or

(b) Examine the issues in multicast routing.

14. (a) Give an account on mail exchange with details.

Or

(b) Describe about the RPC

15. (a) Discuss about the cryptographic principles with details.

Or

(b) Apply DES algorithm to encrypt a given 64 — bit block.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elaborate the OSI reference model briefly.

17. Examine the stop — and —wait protocol.

18. Assess the role of congestion control algorithm in maintaining QoS.

19. Explain the advantages of HTTP in web applications.

20. Illustrate the working of RSA algorithm.

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DISTANCE EDUCATION

M.C.A DEGREE EXAMINATION, MAY 2026.

Third Semester

DATA MINING AND WAREHOUSING

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. List out different types of data.

2. What is data visualization?

3. Define classification in data mining.

4. Write any two applications of association rules.

5. Define DBSCAN algorithm.

6. What is a neural network?

7. Define text mining.

8. Write any two features of Weka tool.

9. Define MapReduce.

10. What is the role of DataNode in Hadoop?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain warehouse server architecture and its role in query processing.

Or

(b) Explain the importance of data quality in successful data mining.

12. (a) Write short notes on advantages and disadvantages of association rule mining

Or

(b) Describe any two real-world applications of classification techniques.

13. (a) Compare K-means and K-medoids algorithms.

Or

(b) Write short motes on applications of machine learning.

14. (a) Discuss the steps involved in web usage mining.

Or

(b) Discuss the advantages of using RapidMiner in real-lime applications.

15. (a) Explain the working of the HDFS in detail with an example of how data is split into blocks and stored.

Or

(b) Discuss with examples how Hadoop helps in real-world Big Data applications.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Define data mining. Explain different data mining techniques with examples.

17. What is association rules? Explain with an example how support and confidence are calculated.

18. Describe genetic algorithm. Explain the working of GA with an example.

19. Explain how temporal and spatial mining are applied in healthcare and environmental studies.

20. Discuss various types of Big Data with examples.

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	31541

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Fourth Semester

INTERNET OF THINGS (IOT)

(CBCS 2020 – 21 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define the term Internet of Things.

2. Give any two examples of domain-specific IoT applications.

3. What is the role of SDN in IoT?

4. Write a short note on Zigbee.

5. How does Raspberry Pi support interfacing in IoT?

6. Why is cloud connectivity important for IoT devices?

7. Define the Python character set with an example.

8. What is the purpose of the if-else statement in Python?

9. How are negative indices used in lists?

10. Differentiate between a list and a tuple.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the characteristics of IoT with suitable examples.

Or

(b) Differentiate between Physical Design and Logical Design of IoT with example.

12. (a) Explain the differences between IoT and M2M with suitable examples.

Or

(b) Explain the role of RFID and Wi-fi as communication modules in IoT.

13. (a) Explain the role of Arduino in building IoT hardware platforms.

Or

(b) Illustrate IoT design for Smart Environment with suitable examples.

14. (a) Discuss the use of for loops with the range() function in Python.

Or

(b) Explain the role of string operators with suitable examples.

15. (a) Explain the process of creating lists and accessing their elements with examples.

Or

(b) Describe indexing and slicing in tuples with examples.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain in detail about IoT ecosystem elements with a neat diagram.

17. Discuss about various IoT components (a) sensors, (b) actuators, (c) RFID, (d) Wi-Fi, (e) power sources with suitable examples.

18. Explain the architecture and working of an IoT-based Smart City system, highlighting cloud and analytics integration.

19. Construct a Python program with functions that use parameters and return values, showing how scope of local and global variables affects execution.

20. Analyze the use of Python packages such as JSON and XML in IoT applications with suitable examples of data exchange.

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	31542

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Fourth Semester

ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING

(CBCS 2020-21 Academic Year onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. List the key task domains of artificial intelligence.

2. Define State Space.

3. Draw a diagram that maps between facts and representation.

4. Explain the main idea of logic programming in short.

5. What is meant by a hard computing?

6. How does learning occur in a Hebb Network?

7. Give an example of a crisp set.

8. Describe the process of defuzzification and its importance.

9. Write a short note on genetic algorithms.

10. Summarize about Mutation.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) How do AI techniques help in problem-solving?

Or

(b) Comment on Best-First search.

12. (a) Briefly describe the approaches to knowledge representation.

Or

(b) What is the role of control knowledge in problem-solving?

13. (a) Soft computing Vs Hard computing — how do they differ.

Or

(b) Illustrate how a linear separability model works.

14. (a) Give a brief overview of operations on fuzzy sets.

Or

(b) Why is fuzzification important in fuzzy logic systems?

15. (a) Identify important terminologies associated with genetic algorithms.

Or

(b) Describe genetic programming in detail.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the concept of heuristic search techniques in Artificial Intelligence. Discuss the role of heuristics in problem-solving and compare commonly used heuristic search algorithms with suitable examples.

17. Describe the syntax and semantics of predicate logic and demonstrate its application in knowledge representation.

18. Discuss the architecture, working principles, and learning methods of different ANN models.

19. How do membership functions influence the performance of a fuzzy system? Explain with suitable applications.

20. Illustrate the classification of genetic algorithms and analyze how each type addresses specific problem-solving scenarios.

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	31543

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Fourth Semester

BIG DATA ANALYTICS AND R PROGRAMMING

(CBCS 2020 – 2021 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Define big data.

2. What is Hadoop?

3. What is MapReduce?

4. List applications of nearest neighbor search.

5. State NoSQL.

6. What is column-oriented storage?

7. List basic data types in R.

8. What is recursion in R?

9. Define a vector in R.

10. Write a syntax to install a package?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the difference between traditional and big data approaches.

Or

(b) Describe the Hadoop ecosystem.

12. (a) Describe the role of map and reduce phase.

Or

(b) Explain distance measures used in similarity.

13. (a) Apply NoSQL for managing social media data.

Or

(b) Analyze challenges in using NoSQL for big data.

14. (a) Explain the features of R.

Or

(b) Describe string manipulation in R.

15. (a) Write a R program to create and manipulate arrays.

Or

(b) Demonstrate creation of a data frame with student data.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Give an account on desired properties of a big data system.

17. Analyze the limitations of nearest neighbor search for big data.

18. Use NoSQL to store and retrieve sensor data.

19. Write a R program using a For loop to display a multiplication table for a given number.

20. Evaluate the usefulness of factors in categorical data.

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	31544

DISTANCE EDUCATION

M.C.A. DEGREE EXAMINATION, MAY 2026.

Fourth Semester

MOBILE APPLICATION DEVELOPMENT

(CBCS 2020 – 21 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. List out uses of smart phones.

2. Recall features of Palm OS.

3. Mention the benefits and limitations of SMS.

4. Identify popular utility apps used in mobile devices.

5. What is meant by a sitemap?

6. List the key elements of mobile design.

7. Define Profile in J2ME.

8. Explain the term SDK.

9. Give notes on Android.

10. Summarize about Apple IOS.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Break down the mobile ecosystem into its key layers.

Or

(b) Enumerate the types of applications in the mobile ecosystem.

12. (a) Elaborate on the role and design of mobile websites.

Or

(b) Comment on Location Based Services.

13. (a) Demonstrate how design is interpreted in mobile platforms.

Or

(b) How do click streams and wire frames differ?

14. (a) Summarize the functioning of J2ME's runtime environment.

Or

(b) Discuss MIDlet programming.

15. (a) Write a short note on the Android development setup.

Or

(b) Differentiate Apple IOS and RIM Blackberry.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe the mobile ecosystem and elaborate on how its different elements work together to support mobile application development and user experience.

17. What are the major categories of mobile applications? Describe each category in detail and explain how they serve various user needs.

18. Comment on mobile information architecture by explaining its importance in mobile app design and how it influences user navigation and experience.

19. Discuss the layered architecture of J2ME along with the tools and components involved in its development environment.

20. Give a detailed overview of Google Android, including its key functionalities, ecosystem support, and role in empowering smartphone technology.

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