

Naan Mudhalvan – Polytechnic – Even Semester 2024-25
4th Semester – Course Curriculum

ABOUT THE COURSE

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| COURSE NAME: | MOBILE APPLICATION DEVELOPMENT |
| TOTAL DURATION: | 60 Hrs |
| MODE OF DELIVERY | PHYSICAL MODE |
| TRAINER TO STUDENT RATIO: | 1:60 |
| TOTAL MARKS: | 70 (External) + 30 (Internal) (Final Assessment shall be done by TNSDC) |

| TABLE 1 | |
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| OVERALL COURSE OBJECTIVE: | <ol style="list-style-type: none"> 1. Equip learners with the skills to build cross-platform, visually appealing, and high-performance mobile applications. 2. Apply Dart programming language fundamentals, Flutter framework concepts, UI design and development, state management techniques, API integration, performance optimization, and deployment strategies. 3. Create feature-rich mobile apps for both iOS and Android platforms, using Flutter's efficient development approach and rich ecosystem of tools and libraries. |
| LEARNING OUTCOME: | <ul style="list-style-type: none"> • Master Dart programming language: Implement its syntax, object-oriented principles, and asynchronous programming concepts. • Utilize Flutter framework effectively: Build responsive and visually appealing user interfaces, manage app state, and implement navigation. • Develop cross-platform mobile apps: Create functional and user-friendly apps for both iOS and Android platforms. • Optimize app performance: Identify and resolve performance bottlenecks, improve load times, and ensure smooth user experiences. • Integrate APIs and third-party services: Fetch and display data from external sources, implement authentication, and leverage popular libraries. • Deploy and publish apps: Prepare and deploy apps to app stores, ensuring smooth user experience and updates. |

| TABLE 2: MODULE WISE COURSE CONTENT AND OUTCOME | | | | |
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| SL.NO | MODULE NAME | MODULE CONTENT | MODULE LEARNING OUTCOME | DURATION (HRS) |
| 1 | Introduction to Mobile App development and the platforms - Flutter and Dart | <ul style="list-style-type: none"> • Overview of mobile app development and cross-platform frameworks • Introduction to Dart programming language: syntax, variables, data types, operators, control flow • Functions, classes, and objects in Dart • Asynchronous programming and futures in Dart | <ul style="list-style-type: none"> • Implement the basics of mobile app development and Flutter's role • Apply the fundamentals of Dart programming language • Write efficient and clean Dart code | 12 hrs |
| 2 | Flutter Fundamentals – Layouts and UI /UX Concepts | <ul style="list-style-type: none"> • Introduction to Flutter framework • Flutter widgets: stateless and stateful widgets • Layout techniques: Row, Column, Stack, and Container • Basic UI components: Text, Image, Icon, and Button • State management techniques: | <ul style="list-style-type: none"> • Build basic Flutter apps with a strong foundation in widgets • Implement the concept of state management in Flutter • Create responsive and visually appealing UI layouts | 10 Hrs |

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| | | setState and Provider | | |
| 3 | Advanced Flutter Concepts | <ul style="list-style-type: none"> • Navigation and routing: Navigator and Route • Theming and customization: ThemeData and MaterialApp • Animations and transitions: Hero animations, Fade transitions • Advanced state management : BLoC pattern • Platform-specific features: accessing device sensors, native features | <ul style="list-style-type: none"> • Implement complex navigation flows within apps • Customize the appearance and behavior of apps • Create engaging user experiences with animations and transitions • Manage complex app state with the BLoC pattern • Leverage platform-specific features to enhance app functionality | 12 Hrs |
| 4 | API Integration and Data Handling | <ul style="list-style-type: none"> • HTTP requests and responses: using the http package • JSON parsing and serialization • State management for API data: Provider and BLoC • Error handling and loading indicators • Data caching and offline functionality | <ul style="list-style-type: none"> • Fetch and parse data from APIs • Handle asynchronous operations effectively • Display data in a user-friendly way • Implement error handling and loading indicators • Improve app performance with data caching | 12 Hrs |

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| 5 | App Deployment and Testing | <ul style="list-style-type: none"> • Setting up development environments: Android Studio, Xcode, and Visual Studio Code • Debugging and testing Flutter apps • Building and running apps on emulators and physical devices • Deploying apps to app stores: Google Play Store and Apple App Store • App performance optimization and profiling | <ul style="list-style-type: none"> • Set up development environments for Flutter app development • Effectively debug and test Flutter apps • Build and run apps on different platforms • Deploy apps to app stores • Optimize app performance and user experience | 14 Hrs |
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| TABLE 3: OVERALL COURSE LEARNING OUTCOME ASSESSMENT CRITERIA AND USECASES | | |
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| LEARNING OUTCOME | ASSESSMENT CRITERIA | USECASES |
| <p>Implementing Core e-commerce concepts: product catalog management, shopping cart functionality, checkout process, order processing, and payment gateways.</p> <p>Applying the Graphic Design for Mobile app development: UI/UX design principles, responsive design, and cross-platform development (if applicable).</p> <p>Work on Backend development: API design, database</p> | <p>Implementing Core E-commerce Features:</p> <ul style="list-style-type: none"> • Product browsing and search • Product details and descriptions • Shopping cart functionality • Checkout process (including guest checkout) • Order tracking and history • Secure payment gateways • Wishlists and saved items • Reviews and ratings <p>User Account Management:</p> | Build a full-fledged e-commerce app with features like product catalog, shopping cart, checkout, and order tracking |

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| <p>integration, and server-side logic.</p> <p>Frontend development: Building interactive user interfaces, handling user input, and implementing state management.</p> <p>Security best practices: protecting user data, preventing security breaches, and complying with data privacy regulations.</p> <p>Performance optimization: optimizing app performance, reducing load times, and improving user experience.</p> <p>Analyse Testing and debugging: identifying and fixing bugs, ensuring app stability, and conducting thorough testing.</p> <p>Deployment and maintenance: deploying the app to app stores, monitoring performance, and providing updates and bug fixes.</p> | <ul style="list-style-type: none"> • User registration and login • Profile management (address, payment information, etc.) • Password recovery • Notifications and alerts <p>Customer Support:</p> <ul style="list-style-type: none"> • Live chat or in-app messaging • Email support • FAQ section <p>Inventory Management:</p> <ul style="list-style-type: none"> • Real-time inventory updates • Out-of-stock notifications • Low-stock alerts | |
| <p>Implement Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Database design and implementation • Server-side logic for user authentication, content sharing, and notifications <p>Work on Frontend Development:</p> <ul style="list-style-type: none"> • Building user interfaces using frameworks like | <p>Development of Social Media Application:</p> <p>User Profiles:</p> <ul style="list-style-type: none"> • Create, edit, and delete user profiles • Upload profile pictures and cover photos • Set privacy settings <p>News Feed:</p> <ul style="list-style-type: none"> • Display posts from friends and followed users • Like, comment, and share posts • Filter and sort news feed | <p>Create a social media app with features like user profiles, news feeds, messaging, and content sharing.</p> |

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| <p>React Native or Flutter</p> <ul style="list-style-type: none"> • Handling user input and interactions • Implementing real-time features and notifications <p>Practical design for Mobile App Development:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Implement Security Systems:</p> <ul style="list-style-type: none"> • Data privacy and security best practices • Protecting user data from unauthorized access <p>Implement Performance Optimization:</p> <ul style="list-style-type: none"> • Optimizing app performance, reducing load times, and improving user experience <p>Testing and Debugging:</p> <ul style="list-style-type: none"> • Identifying and fixing bugs • Ensuring app stability and reliability | <p>Messaging:</p> <ul style="list-style-type: none"> • Send direct messages to other users • Group chats • Real-time messaging <p>Content Sharing:</p> <ul style="list-style-type: none"> • Post text, images, and videos • Add hashtags and location tags • Use emojis and stickers <p>Notifications:</p> <ul style="list-style-type: none"> • Receive notifications for likes, comments, messages, and friend requests • <input type="checkbox"/> Search Functionality: • Search for users, posts, and hashtags | |
| <p>Apply Design on Mobile App Development:</p> <ul style="list-style-type: none"> • UI/UX design principles | <p>Implementing Workout Tracking:</p> <ul style="list-style-type: none"> • Manual entry of workouts • Automatic tracking using device sensors | <p>Develop a fitness app that tracks workouts, calories burned, and sleep patterns.</p> |

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| <ul style="list-style-type: none"> • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Interface Sensor Integration:</p> <ul style="list-style-type: none"> • Working with device sensors (accelerometer, gyroscope, heart rate monitor) • Processing sensor data to extract meaningful information <p>Data Storage and Retrieval:</p> <ul style="list-style-type: none"> • Storing user data locally and in the cloud • Retrieving and processing data for analysis and visualization <p>Data Visualization:</p> <ul style="list-style-type: none"> • Creating charts and graphs to visualize user data (e.g., progress charts, sleep patterns) <p>Machine Learning and AI:</p> <ul style="list-style-type: none"> • Implementing machine learning algorithms for activity recognition and sleep stage detection <p>User Experience Design:</p> <ul style="list-style-type: none"> • Creating a user-friendly and engaging app experience | <p>(e.g., accelerometer, GPS)</p> <ul style="list-style-type: none"> • Support for various workout types (e.g., running, cycling, swimming, weightlifting) <p>Analyse Calorie Tracking:</p> <ul style="list-style-type: none"> • Calorie intake tracking • Calorie expenditure tracking based on workouts • Personalized calorie goals <p>Analyse Sleep Tracking:</p> <ul style="list-style-type: none"> • Automatic sleep tracking using device sensors • Sleep quality analysis • Sleep duration tracking <p>Goal Setting:</p> <ul style="list-style-type: none"> • Customizable fitness goals • Analyse tracking and visualization <p>Social Features:</p> <ul style="list-style-type: none"> • Connect with friends and family • Share fitness achievements • Join challenges and competitions | |
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| <ul style="list-style-type: none"> • Designing intuitive interactions and navigation | | |
| <p>Design an User Acceptance Mobile App Development:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Work on Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Database integration • Server-side logic for order processing, payment processing, and notifications <p>Apply Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing real-time features and notifications <p>Integrate Location-Based Services:</p> <ul style="list-style-type: none"> • Integrating maps and GPS to display nearby restaurants • Using location data for delivery tracking and personalized recommendations | <p>Analyse Restaurant Listing:</p> <ul style="list-style-type: none"> • Display local restaurants with their menus and ratings • Search and filter restaurants by cuisine, location, or other criteria <p>Effective Order Placement:</p> <ul style="list-style-type: none"> • Add items to the cart • Customize orders (e.g., add-ons, modifications) • Checkout process with payment options <p>Implement Order Tracking:</p> <ul style="list-style-type: none"> • Real-time tracking of order status • Estimated delivery time • Push notifications for order updates <p>Payment Integration:</p> <ul style="list-style-type: none"> • Secure payment gateways (e.g., credit/debit cards, digital wallets) <p>Customer Support:</p> <ul style="list-style-type: none"> • In-app messaging or live chat with customer support • Email support | <p>Build a food delivery app that connects users with local restaurants.</p> |

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| <p>Implement Payment Integration:</p> <ul style="list-style-type: none"> Integrating secure payment gateways (e.g., Stripe, PayPal) Handling payment processing and security <p>Database Design and Management:</p> <ul style="list-style-type: none"> Designing database schemas for storing user, restaurant, and order data Implementing efficient data retrieval and storage techniques | | |
| <p>Implement Design on Mobile App Development:</p> <ul style="list-style-type: none"> UI/UX design principles Responsive design for different screen sizes Cross-platform development (if applicable) <p>Educational Technology:</p> <ul style="list-style-type: none"> Instructional design principles Learning theories and strategies Effective use of multimedia <p>Work on Backend Development:</p> <ul style="list-style-type: none"> API design and development Database integration Server-side logic for content | <p>Work on Content Delivery:</p> <ul style="list-style-type: none"> Clear and concise educational content (text, images, videos) Interactive lessons and quizzes Analyse tracking and performance analytics <p>Implement User Interface:</p> <ul style="list-style-type: none"> Intuitive and easy-to-navigate interface Adaptive layout for different screen sizes Engaging visual design <p>Learning Tools:</p> <ul style="list-style-type: none"> Flashcards and vocabulary builders Practice exercises and quizzes Personalized learning paths <p>Social Features:</p> <ul style="list-style-type: none"> Discussion forums and chat rooms | <p>Create an educational app for a specific subject or age group.</p> |

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| <p>delivery, user authentication, and Analyse tracking</p> <p>Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing gamification elements and Analyse tracking <p>User Experience Design:</p> <ul style="list-style-type: none"> • Creating a user-friendly and engaging app experience • Designing intuitive interactions and navigation | <ul style="list-style-type: none"> • Collaborative learning features | |
| <p>Develop an Responsive Mobile App:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Database Design and Management:</p> <ul style="list-style-type: none"> • Designing database schemas for storing tasks, notes, and user data • Implementing efficient data retrieval and storage techniques | <p>Implement Task Management:</p> <ul style="list-style-type: none"> • Create, edit, and delete tasks • Set deadlines and priorities • Organize tasks into projects or lists • Track task progress and completion <p>Apply Time Tracking:</p> <ul style="list-style-type: none"> • Start and stop timers for different tasks • Generate time reports and analytics • Set time budgets and alerts <p>Note-Taking:</p> <ul style="list-style-type: none"> • Create and edit notes • Organize notes into notebooks • Search and filter notes • Add tags and labels to notes <p>Calendar Integration:</p> | <p>Develop a productivity app with features like task management, time tracking, and note-taking.</p> |

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| <p>Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Server-side logic for data synchronization, user authentication, and notifications <p>Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing real-time features and notifications <p>User Experience Design:</p> <ul style="list-style-type: none"> • Creating a user-friendly and engaging app experience • Designing intuitive interactions and navigation | <ul style="list-style-type: none"> • Sync tasks and events with a calendar app • Set reminders and notifications <p>Cloud Synchronization:</p> <ul style="list-style-type: none"> • Sync data across multiple devices • Backup and restore data | |
| <p>Develop an responsive Mobile App:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Implement Health and Wellness Technology:</p> <ul style="list-style-type: none"> • Implement a mental health and wellness concepts | <p>Implement Meditation Methods:</p> <ul style="list-style-type: none"> • Implement meditation sessions with audio and visual cues • Customizable meditation timers and settings • Analyse tracking and insights <p>Analyse Yoga Poses:</p> <ul style="list-style-type: none"> • Yoga poses and sequences for different levels • Video and text instructions • Analyse tracking and goal setting | <p>Build a health and wellness app with features like meditation, yoga, and mental health tools.</p> |

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| <ul style="list-style-type: none"> • Integration of mindfulness and meditation techniques • Use of technology to promote well-being <p>Work on Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Database integration • Server-side logic for user authentication, content delivery, and data analytics <p>Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing multimedia content (audio, video) | <p>Work on Mental Health Tools:</p> <ul style="list-style-type: none"> • Mood tracking and journaling • Mindfulness techniques and exercises • Breathing exercises and relaxation techniques <p>Personalized Recommendations:</p> <ul style="list-style-type: none"> • Tailored recommendations based on user preferences and goals • Personalized workout plans and meditation schedules | |
| <p>Develop an responsive Mobile App:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Work on Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Database integration • Server-side logic for data retrieval, | <p>Implement Flight Booking:</p> <ul style="list-style-type: none"> • Search for flights based on origin, destination, dates, and passengers • Filter results by price, airline, and travel duration • Book flights directly through the app <p>Apply Hotel Reservations:</p> <ul style="list-style-type: none"> • Search for hotels based on location, price range, and amenities • View hotel details, including photos and reviews | <p>Create a travel app with features like flight booking, hotel reservations, and travel guides.</p> |

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| <p>processing, and storage</p> <p>Work on Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing real-time features and notifications <p>Third-Party API Integration:</p> <ul style="list-style-type: none"> • Integrating with APIs for flight, hotel, and transportation data • Handling API requests and responses | <ul style="list-style-type: none"> • Book hotel rooms directly through the app <p>Apply Travel Guides:</p> <ul style="list-style-type: none"> • Destination information (history, culture, attractions) • Personalized travel itineraries • Offline access to maps and guides <p>Currency Converter:</p> <ul style="list-style-type: none"> • Real-time currency conversion <p>Language Translation:</p> <ul style="list-style-type: none"> • Basic language translation for common phrases | |
| <p>Develop an responsive Mobile App:</p> <ul style="list-style-type: none"> • Game mechanics and level design principles • User experience and user interface design • Game balancing and difficulty curve <p>Game Development:</p> <ul style="list-style-type: none"> • Game engine usage and scripting • Asset creation and management • 2D and 3D graphics • Sound design and implementation <p>Programming:</p> <ul style="list-style-type: none"> • Proficiency in game development languages (C#, | <p>Implement Game Mechanics: Clear and intuitive game mechanics that are easy to learn but challenging to master.</p> <p>Level Design: Well-designed levels that progressively increase in difficulty.</p> <p>Game Objectives: Clear and achievable goals for each level or stage.</p> <p>User Interface (UI): Visually appealing and user-friendly interface.</p> <p>Controls: Responsive and intuitive controls (touchscreen or physical controls).</p> <p>Feedback: Clear and timely feedback to player actions.</p> <p>Sound Design: Engaging sound effects and music.</p> | <p>Develop a mobile game, such as a puzzle game, strategy game, or arcade game.</p> |

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| <p>Java, JavaScript, etc.)</p> <ul style="list-style-type: none"> • Object-oriented programming concepts • Algorithm design and problem-solving | | |
| <p>Develop an responsive Mobile App:</p> <ul style="list-style-type: none"> • UI/UX design principles • Responsive design for different screen sizes • Cross-platform development (if applicable) <p>Backend Development:</p> <ul style="list-style-type: none"> • API design and development • Database integration • Server-side logic for data storage, retrieval, and processing <p>Frontend Development:</p> <ul style="list-style-type: none"> • Building interactive user interfaces • Handling user input and interactions • Implementing data visualization techniques <p>Financial Concepts:</p> <ul style="list-style-type: none"> • Budgeting and expense tracking • Investment principles and strategies • Financial planning and goal setting | <p>Apply Budgeting:</p> <ul style="list-style-type: none"> • Set monthly or weekly budgets • Track income and expenses • Generate budget reports and visualizations <p>Apply Expense Tracking:</p> <ul style="list-style-type: none"> • Categorize expenses (e.g., food, transportation, entertainment) • Set spending limits for categories • Track recurring expenses <p>Investment Tracking:</p> <ul style="list-style-type: none"> • Track investments in stocks, bonds, and mutual funds • Calculate returns and portfolio performance • Set investment goals and track progress <p>Financial Goals:</p> <ul style="list-style-type: none"> • Set financial goals (e.g., saving for a house, retirement) • Track progress towards goals <p>Financial Insights:</p> <ul style="list-style-type: none"> • Provide personalized financial advice and tips • Generate financial reports and forecast | <p>Build a personal finance app with features like budgeting, expense tracking, and investment tracking</p> |

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| Data Privacy and Security: <ul style="list-style-type: none"> Protecting user data and complying with regulations Implementing secure authentication and authorization mechanism | | |
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TABLE 4: LIST OF FINAL PROJECTS (20 PROJECTS THAT COMPREHENSIVELY COVER ALL THE LEARNING OUTCOME)

| SL.NO | FINAL PROJECT |
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| 1 | Build a full-fledged e-commerce app with features like product catalog, shopping cart, checkout, and order tracking |
| 2 | Create a social media app with features like user profiles, news feeds, messaging, and content sharing. |
| 3 | Develop a fitness app that tracks workouts, calories burned, and sleep patterns. |
| 4 | Build a food delivery app that connects users with local restaurants. |
| 5 | Create an educational app for a specific subject or age group. |
| 6 | Develop a productivity app with features like task management, time tracking, and note-taking. |
| 7 | Build a health and wellness app with features like meditation, yoga, and mental health tools. |
| 8 | Create a travel app with features like flight booking, hotel reservations, and travel guides. |
| 9 | Develop a mobile game, such as a puzzle game, strategy game, or arcade game. |
| 10 | Build a personal finance app with features like budgeting, expense tracking, and investment tracking |

TABLE 5: COURSE ASSESSMENT RUBRICS (TOTAL MARKS: 70)

| ASSESSMENT CRITERIA | DESCRIBE THE CRITERIA OF THE BELOW CATEGORY PERFORMANCE | | | TOTAL MARKS |
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| | FAIR | GOOD | EXCELLENT | |
| Apply and Implementing | Recalls key definitions and concepts. | Explains concepts in a clear and concise manner. | Applies concepts to solve problems and answer questions in a comprehensive and insightful manner. | 20 |

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| Application and Analysis | Attempts to apply knowledge to solve problems, even if the solution is not entirely accurate. | Applies knowledge to solve problems correctly, demonstrating a clear implementation of the concepts involved. | Critically analyzes problems, identifies relevant concepts, and applies knowledge to develop creative and effective solutions. | 20 |
| Evaluation and Synthesis | Identifies relevant information from various sources. | Analyzes and critiques information from various sources, identifying strengths and weaknesses. | Synthesizes information from various sources to form well-founded arguments and evidence-based conclusions. | 15 |
| Communication Skills | Presents information in a clear and organized manner, but may lack detail or clarity. | Presents information in a clear, concise, and well-organized manner, using appropriate language and terminology. | Presents information in a clear, concise, and well-organized manner, using sophisticated language and terminology to engage the audience. | 15 |

| S.No | ASSESSMENT CRITERIA | Max Marks | Awarded Marks |
|------|---|---------------------------|--------------------------|
| 1 | Project Implementation: Build a full-fledged e-commerce app with features like product catalog, shopping cart, checkout, and order tracking | Fair Good Excellent | 1 – 3 4 – 7 8 – 10 |
| 2 | Project Implementation: Create a social media app with features like user profiles, news feeds, messaging, and content sharing. | Fair Good Excellent | 1 – 3 4 – 7 8 – 10 |
| 3 | Project Implementation: Develop a fitness app that tracks workouts, calories burned, and sleep patterns. | Fair Good Excellent | 1 – 3 4 – 7 8 – 10 |

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| 4 | Project Implementation: Build a food delivery app that connects users with local restaurants. | Fair Good Excellent | 1 - 3 4 - 7 8 - 10 |
| 5 | Project Implementation: Build a health and wellness app with features like meditation, yoga, and mental health tools. | Fair Good Excellent | 1 - 3 4 - 7 8 - 10 |
| 6 | Project Implementation: Create a travel app with features like flight booking, hotel reservations, and travel guides. | Fair Good Excellent | 1 - 3 4 - 7 8 - 10 |
| 7 | Project Implementation: Build a personal finance app with features like budgeting, expense tracking, and investment tracking | Fair Good Excellent | 1 - 3 4 - 7 8 - 10 |
| Total Marks | | 70 | |