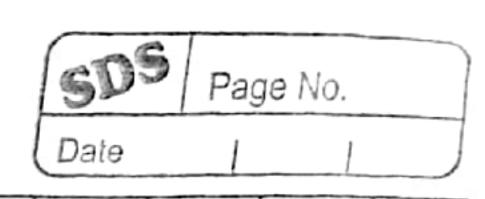
ARYAN DEEPAK SARAF D15B SDS | Page No. MPL ASSIGN-1 Explain key features and advantages of using Flutter for mobile app development. Key flatures of Flutter:-1) single codebase: - Write one code for both Android and ios. 2] Fast Performance: - Uses Dort languages and a righ-performance gendering engine. 3] Hot Reload: Lee change instantly without restarting the app. 4] Rich ut components: Comes with customizable. widgets for smooth UI design. 5] Native-like Experience: - Providus high-quality animations and fast execution. Advantages of Using Flutter:

1) saves & Effort: - single codebose for multiple platforms. 2] High spreed Development: - Hot Reload feature speeds up coding. 3] cost-Effective: Reduces development cost 4] Attractive JI: - Provides beautiful and customizable widgets:
5] Good Performance: - Use Doit and Skia for fast and smooth rendering. from traditional opproaches and why it has gained popularity in developer community



How Flutter Differ from trad Inaditional Approaches: I single Loddbose: Traditional methods new separate code for Android and ios, but Flutter uses one code for both. 2] Hot Reload: - Iraditional opps require full overtart ofter changes, but tutter updates 3) VI Rendering: Fraditional apps use natine components, while flutter has its own rendering engine for faster perforestormance: - Flutter compiles directly to native machine code, making it faster than framework that uses a bridge. Why Flutter is Popular Among Developers:

1] Fast Development: - Hot Reload and single codebase same time. 2) Cross-Platform dupport: - Works on mobile, web and desktop. 3] Beautiful vI:- Rich, customizable widgets for modern design.

4] High Performance: - Reurs smoothly without a widge like React Native. Describe concept of the widget tree in Elutter. Eschlain how widget composition is used to build complex user interface

	concept of widget Iree in thattee:
,-	In Flutter everthing is a medget ulidgets are
	arranged in a tree structure, called midget
	tree. This tree supresents UI of the app,
	where parent widget contain child widget.
	For example, a scaffold widget can have a
	For example, a scaffold widget can have a colurn widget, which contains Jest and
	Button widgets.
	Wigt Widget composition for complex UT:
	High Widget composition for complex viilgets to
	build complex UI, instead of creating
	a single large UI block, developers
	combino multiple small widgets like
	Rows, columns, containers and Buttons
	For example:
	I A list lieu can contain multiple cond
	Widgets.
	2) A column can hold test, Images & Buttons.
	she modular approach make UI flexible
	readable and easy to manage.
. 7	A ida de didante
رط	Provide examples of sommonly used widgets and their nells in occating widget tree.
	and then siell in second mage sail
->	JACAHAIL :- Provides basics layout structure
	$\frac{1}{2}$
	27 Ahh Bar: Dishlays toh navigation bor with title
	779
The same	FOR EDUCATIONAL USE

	3] Jext: Displaye simple text on the screan				
	4] Image: Shows images from affects or URLs.				
	5) container: - Med for styling (Background				
	roloi, padding margin).				
	6] Row: Lovianges child midgets horizontally.				
	1) column: Avrange child widgets vertically.				
	8] List view :- Displaye scrollable lists.				
	1) Elevated Button - A dick alle button with				
	elevation.				
	10) Textfield: - Used for user input.				
	Example Widget tree:-				
	in the state of th				
	My APP;				
	naterial App				
	1				
	My Home page)				
	(My tortepay)				
Ę	(Scaffold)				
\					
	App Bar   Center   Floating Action Button				
	BUTTON				
	Text				
	Text Text				
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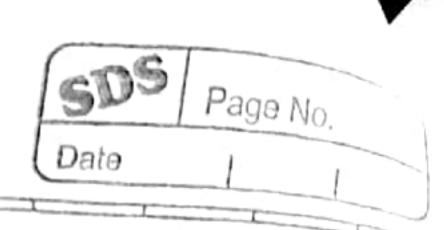
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On · 3] a]	Diocuss the importance of state
	Diocuss the importance of state management in Flutter application.
=>	Importance of State Management in Flutter Application:
	Application:
	State Management is important because
	it controls how the app stores, updates
- <b>-</b>	and displays data when the user interacts
	with it.
	0.11.
	Why It State Management is Needed?
	I Keeps VI updated: - Ensures that the app
	suffects changes (eg. button clicks, text
	2) Improves Performance: updates only
	necessary parts of UI instead of reloading
	everything.
	3] Manages complex Data: Helps handle
	use Inputs, API data and navigation
	Afficiently.
	4] Ensure smooth User Expérience: reche
	the app surpansine & interactine.
	Types of state in Elutter:-
	I local state: Managed within a single
	midget using statefultiligei.
	2] Global State: - shared across multiple screen
	using Provider, Riverpod, Bloc or Redusc.
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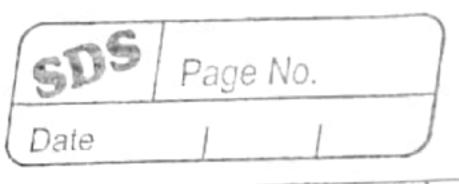
		••				
b]	b) compare and contrast the different path state management approaches available					
	in Flut		State, Provide			
	1 River	iod.				
	Approach	How it works	when to use			
	setstate	211.1.1				
	seron m, x	Updates UT luy	Best for small apple			
			or managing			
		in a stateful-	state within a			
		Widget	single widget.			
			Escample: Jogging			
			a button color.			
	0010.110/01					
	Provide	Uses Inherited Widget	//			
		to share state	sized appe where			
		across widgels	data need to			
		efficiently.	be shared between			
			multiple			
			widgets Escample:			
			Managing use			
			authentication			
	Riverpod	An improved version	Best for large apply			
	, 	of Provider with	that need complex			
		better performance	state management			
		& simpler syntasc	with dependency			
			injection. Escample			
			Handling API data			
			I opp - will thomes			
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choosing Right Approach: · Use resolder for simple vI updates. · Use Perovider for moderate state sharing across midgely. · Use Riverpod for scalable, well-structured applications Explain the process of integrating Fireboxe ruits thutter application. Lincuss the benefits of using Fireboxe as a backend solution. Frocess of integrating Finebose with a Flutte Application: Deserte a Finebase Project - yo to [Finebase console] (https:// console.finebase.google.com/)
, create a new project. 2] Add Firebose to Flutter App: - Register the app (Android/ios) and download the google-searvices-json or Google Service-Info. plist (ios). 3) Anstall Firebase Packages: Add dependencies and firebase auth like 'firebase core'
in 'pulispec yam'. 4] Initialize Firebase 5] Use Firebose services: Implement authentication database, or doud functions as needed.



Benefits of Using Finebase as a Backen! I Real-time Database: - syncs data instanty across devices. 2) Authentication: - Provides ready to use sign-in options (yooge, Email etc)
3] cloud Firestore: - Stores structured data efficiently. 4] Hosting & storage: - Hosts web affe 5] statability: - Mandles larger user bases without managing servers. b] Highlight the Firebox services commonly used in flutter development & provide a brief overview of how data synchronzation is achieved. Development: 1) Firebose Authentication: - Provides user sign-in methods (yoogle, Email, Facebook) 2) cloud Firestore: - A Nosai database that stones & syncs datate in real sime 3] Firebose Realtine Databose: - stones & Updates data instartly across all connected devices. 4) Firebose cloud storage: - Used for storing 4 retrieving files like images & videos. 5) Firebose Analytins: - Iracks user behaviou 6 app performance



Now data Synchronization is Achieved! J Real-time updates: - Firestore & Realtine Database synce data across devices instantly 2) listener & streams: - widgets listen for charges & update the UI automatically. 3] offline support: - Firebase caches data, allowing apps to work offline & sync This ensure fost smooth & automatic data updates in Flutter affs.