Dynamic Routing

Configuring a dynamic routing protocol on a router so that it finds the best routes to the destination networks, not fixed.
A protocol metric: how it measures how far the destination is as root cost in STP to determine best route to a destination.
Administrative distance: to determine the best route to a destination.
Network route: a route to a network/subnet of mask length< 32.
Host route: a route to a specific host of /32 mask.
Invalid routes are automatically removed, routers advertise connected and learned routes by forming adjacencies with adjacent routers to exchange information, superior route is detected via lowest metric.

Dynamic routing protocols can be :IGP → Interior Gateway Protocol or EGP→ Exterior Gateway Protocol.
IGP: to share routes within a single autonomous system (AS) which is a single organization → algorithm types: Distance Vector as RIP (Routing Information Protocol) and EIGRP (Enhanced Interior Gateway Routing Protocol).
-Link State as OSPF→ Open Shortest Path First and IS-IS → Intermediate System to Intermediate System.
Distance vector protocols were invented before link state protocols.
EGP: to share routes between different autonomous systems → algorithm types: path vector→ EGP used is BGP (Border Gateway Protocol).
Distance vector Protocols: operate by sending known dest networks and metric to reach their known dest networks, known as routing by rumor because the router doesn't know about the network beyond its neighbors, only knows the information its neighbors tell it, the routers only learn distance and vector (next hop direction) of each route (share routing table or parts of it with neighbors).
Link State: every router creates a connectivity map of the network and its the same on each router, each router advertises information about its interfaces (connected networks) to its neighbors, this info is passed along to other routers to develop the map, each router individually uses this map to calculate the best routes to each destination, use more resources and faster to reacting to changes in the network than distance vector protocols.
If a router learns 2 or more routes using the same routing protocol to the same dest with the same metric, traffic will be load balanced over them (ECMP) Equal Cost Multi-Path (load - balancing).
Static routes don't use metric (0) and have AD → administrative distance of 1
In most cases a company uses A SINGLE IGP usually OSPF or EIGRP, in some rare cases they might use 2 if 2 companies connect their networks to share information.
A lower AD is more trustworthy when comparing metric of different routing protocols.
When adding a static route you can configure its metric ip route <address> <mask> <next hop> <AD> to make it less preferred than routes learned by dynamic protocols (floating static route). (most specific route is of longest prefix).
Traceroute on CISCO IOS and tracert <dest-ip> in windows.
clock rate clock-rate to set speed of a serial interface on DCE and not DTE side of the cable.

IGP	Metric	Explanation
RIP	Hop count	Each router in the path counts as one 'hop'. The total metric is the total number of hops to the destination. **Links of all speeds are equal.**
EIGRP	Metric based on bandwidth & delay (by default)	Complex formula that can take into account many values. By default, the bandwidth of the **slowest link in the route** and the total delay of all links in the route are used.
OSPF	Cost	The cost of each link is calculated based on bandwidth. The total metric is the total cost of each link in the route.
IS-IS	Cost	The total metric is the total cost of each link in the route. The cost of each link is **not** automatically calculated by default. All links have a cost of 10 by default.