

Jharkhand University of Technology, Ranchi**6th Semester B.Tech. Examination, 2022****Subject : Internet of Things****Subject Code : IT-602****Time Allowed : 3 Hours****Full Marks : 70****Pass Marks : 21**

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1. Internet Protocol Version6 (IPv6):- 7+7=14
- i. Internet Protocol Version6 (IPv6) is a newer version of the network layer protocol that is designed to coexist with IPv4. A full deployment of Internet of Things (IoT) applications will certainly stress the IPv4 environment.
 - ii. Internet service providers (ISPs) and carriers have been preparing for IP-address exhaustion for a number of years, and there are transition plans in place. The expectation is that IPv6 can make IP devices less expensive, more powerful, and even consume less power; the power issue is not only important for environmental reasons, but also improves operability.
 - iii. IPv6 basic protocol capabilities include the following: addressing; anycast; flow labels; Internet Control Message Protocol version6 (ICMPv6); and neighbor discovery (ND). The use of network-layer encryption mechanism nearly doubles IP operational overhead. Header compression (HC) is, therefore, of interest.
2. What is Raspberry Pi? 7+7=14
- i. Raspberry Pi is a much popular device used in building IoT project.
 - ii. The recently launched Raspberry Pi 3 includes built-in WiFi and Bluetooth making the most compact and standalone computer.
 - iii. It provides a powerful environment to install a variety of programming packages such as Python, Node.js, LAMP stack, Java and much more.
 - iv. Using 40 GPIO pins, and four USB ports you can connect many peripherals and accessories to the Pi.
3. What is Arduino Device? 7+7=14
- i. Arduino devices are the microcontrollers and microcontroller kit for building digital devices that can be sense and control objects in the physical and digital world.
 - ii. Arduino boards are furnished with a set of digital and analog input/output pins that may be interfaced to various other circuits.
 - iii. Some Arduino boards include USB (Universal Serial Bus) used for loading programs from the personal computer.
4. IPv6 tunneling? 7+7=14
- i. Tunneling provides a way to use an existing IPv4 routing infrastructure to carry IPv6 traffic.
 - ii. The key to a successful IPv6 transition is compatibility with the existing installed base of IPv4 hosts and routers.

- a. Maintaining compatibility with IPv4 while deploying IPv6 streamlines the task of transitioning the Internet to IPv6.
 - b. While the IPv6 infrastructure is being deployed, the existing IPv4 routing infrastructure can remain functional, and can be used to carry IPv6 traffic.
 - c. IPv6 or IPv4 hosts and routers can tunnel IPv6 datagrams over regions of IPv4 routing topology by encapsulating them within IPv4 packets. Tunneling can be used in a variety of ways:
 - i. Router-to-Router
 - ii. Host-to-Router
 - iii. Host-to-Host
 - iv. Router-to-Host
5. What is IPSec in ipv6? 7+7=14
 - i. that Internet Protocol Security (IPSec) is incorporated into IPv6. This statement simply means that communication between the two endpoints is either authenticated, encrypted, or both, via the extension headers. There is a long-running discussion on the internet regarding whether the interpretation of "IPSec being mandatory" in IPv6 is correct or not. If you need to know more about this topic, see RFC 6434.
6. Header Compression Schemes? 7+7=14
 - i. Low-power wireless personal area network (LoWPAN) consists of large number of resource constraint devices connected over a wireless link with the aim of gathering real time information and transmitting it to desired application and vice versa.
 - ii. This requires transmission of IPv6 packets over Low-power wireless personal area network and is called 6LoWPAN.
 - iii. The large sized headers like IPv6, TCP, and UDP consume most of the packet space leaving only 28 bytes for actual payload.
 - iv. MTU of 802.15.4(IEEE standard for wireless network) is only 127 bytes much less as compare to IPv6 packet which is of 1280 bytes. Hence Header compression and fragmentation becomes a necessity in 6LoWPAN so as to provide reasonable number of bits for payload.
 - v. This paper depicts 6LoWPAN protocol stack and various header compression techniques for compressing IPv6 header. It also shows comparison among various techniques on the basis of total number of bits needed in compressed IPv6 header under various scenarios.
7. IP in Smart Objects (IPSO)? 7+7=14
 - i. In many budding smart projects, there's often a missing piece of the IoT puzzle that hampers their development – this piece is called data interoperability. OMA Specworks' IPSO Smart Objects are meant to take care of that and make all smart things fall into place.
 - ii. One of the things that people need to interact and collaborate with in an effective and meaningful fashion is a common language. And the same goes for IoT devices – the more standardized the mode of communication is, the more possibilities emerge and fewer vulnerabilities loom large on the horizon.
 - iii. What is also undoubtedly true to be said about the Internet of Things industry, is that there have been many efforts so far to establish standards for interoperability on different levels of the IoT technology stack, with IoT protocols at the forefront. One such protocol, and one that is rapidly gaining ground, is the Lightweight M2M, a standard dedicated for resource-constrained devices that plays a great role in the popularization of IoT among the industries, but we'll come back to this later.