

**SYLLABUS FOR ON-LINE EXAMINATIONS FOR RECTT ON POSTS OF  
ASSISTANT MANAGER /E-0 AND ASSISTANT GENERAL MANAGER/E-4**

**Part I (15 Marks, 5 each):-**

- a. Networks: Network graphs: matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Solution methods: nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's maximum power transfer, Wye-Delta transformation. Steady state sinusoidal analysis using phasors. Linear constant coefficient differential equations; time domain analysis of simple RLC circuits, Solution of network equations using Laplace transform: frequency domain analysis of RLC circuits. 2-port network parameters: driving point and transfer functions. State equations for networks.
- b. Electronic Devices: Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode, Basics of LASERS. Device technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.
- c. Analog Circuits: Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. Simple diode circuits, clipping, clamping, rectifier. Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single and multi-stage, differential and operational, feedback, and power. Frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators; criterion for oscillation; single-transistor and op-amp configurations. Function generators and wave-shaping circuits, 555 Timers. Power supplies.

**Part II 40 marks, 10 each**

- a. Digital circuits: Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift registers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor (8085): architecture, programming, memory and I/O interfacing.
- b. Electromagnetic Theory:-  
Elements of vector calculus: divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms. Wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; impedance

matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.

c. Communication Systems: -

Amplitude, Frequency and Phase Modulation, Modulation index and power relations in AM, Modulation and detection of AM and FM wave, Sampling and Data Reconstructions, Quantization & Coding, Digital Modulation Techniques: ASK, FSK, PSK and M-ary PSK, Time Division and Frequency Division Multiplexing, Equalization, Propagation of signals at HF, VHF, UHF and Microwave Frequency, Satellite communication,

d. Concepts of Electrical Technology:

AC Machine 1 & 3 phase, DC & AC Circuit Analysis, CT/PT Transformers, Digital Sub Stations, Earthing, Earth Fault neutralizer, Power Corrective devices, Power Factors, Power Factor correction, Communication in Power Systems, LT & HT Switchgears & Panels, Electrical Relays, Electrical Protections, Electrical Structures of Data centers and Telecom Noc, Essentials Of Substations, Electrical Equipment and Busbar Arrangements, UPS Systems, HVAC Systems, Diesel & Generator principal & operations, Power supply system and layouts, Energy Conservations( Solar, LED's etc), Electrical Lighting systems, IEC(Indian Electricity Codes), Load & Loss calculations.

**Part III (45 Marks, 15 each)**

e. Concepts of Optical Fiber Communication Systems:

Interference and Diffraction & Dispersion, principles of LASERS, Photodiodes, principles of fiber communication, step & graded index fiber, single mode and multi-mode optic propagation, Optical sources: LED and Lasers, Optical Receivers: APD and PIN photodiode, Optical Fiber Transmission Technologies and systems, SDH standards, architecture of optical transport networks (OTNs), network topologies, protection schemes SDH, and wavelength routed architectures. Operational principle of WDM, WDM network elements and Architectures, Introduction to DWDM

f. Wireless Communications systems:

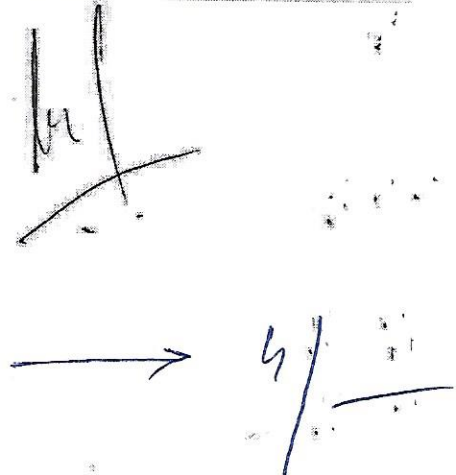
Introduction to wireless communication, Frequency Division Multiple access, Time Division Multiple access, Spread Spectrum Multiple access, Space Division Multiple access, and OFDM, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, trunking and grade of service, improving the capacity of cellular systems. and related design problems,

2G Technologies, GSM Network architecture, signaling protocol architecture, GSM evolution in GPRS and EDGE: Architecture and services offered, 3GPP LTE Introduction and system overview, Logical and Physical Channels: Mapping of data on to logical sub-channels physical layer procedures, establishing a connection, retransmission and reliability, power control, Emerging Technologies for 4G, Multi antenna Technologies: MIMO; software defined radio, Adaptive multiple antenna techniques, radio resource management, QOS requirements.

g. Computer Networks:-

Data communications concepts, Network Topologies, Concepts of LAN, Ethernet Protocol, Concepts of WAN, Larger Architecture-OSI and TCP/IP concepts, IP protocols, architecture of a computer network and explain how each device in a network communicates with each other; processes in each layer of the network protocol that enables different networks to share resources; basic network protocols in each layer of a TCP/IP stack and the purpose of each protocol; various services and functionalities of specific mechanisms in each protocol and their usage in a computer network; Network Request for Comment (RFC); compare and contrast each layer in the TCP/IP model with those in the OSI model; socket programming and explain its role in application processing; IP addressing and explain its purpose; packet collisions and how they are corrected in the link layer; CSMA and describe its use in the link layer; application protocols such as VoIP and IPTV; and TCP/IP security related issues.

Concepts of Switching technology, routing technology, WAN technology, DNS and DHCP



**SYLLABUS FOR ON-LINE EXAMINATIONS FOR RECRUITMENT POSTS OF SENIOR MANAGERS (OSS)**

**Senior Manager/OSS (NOC Processes & Practices)**

- e-TOM framework & functionalities of various verticals/sub verticals
- Telecom NOC functionalities - various functions of NOC
- NOC Practices & implication on Network health & operational efficiency
- ITIL processes related to Telecom Network Management
- Process KPIs
- Operational efficiency parameters of NOC for benchmarking & improvements
- Critical KPIs of Help desk, NOC process, Network
- ISO 9001:2015
- ISO 27001
- Basics of telecom technologies (SDH, NGN Switches, MPLS, ISP, IT)

**Senior Manager/OSS (Service Assurance)**

- e-TOM/NGOSS framework & functionalities of various verticals/sub verticals
- Telecom NOC functionalities - various functions of NOC
- Operational efficiency parameters of NOC
- Assurance stack - building blocks, detailed functionalities & inter dependencies
- Operational efficiency parameters of NOC for benchmarking & improvements
- Critical KPIs of Help desk, NOC process, Network
- Basics of telecom technologies (SDH, Switches, MPLS, ISP, IT)
- NBIs protocols: SNMP, ASCII, Syslog, CORBA, XML, REST APIs etc
- Basics of UNIX, SQL, Shell & Perl scripting