## DISCLAIMER

The model question paper only offers a broad overview and does not purport to represent either the syllabus or the pattern of questions that would appear in the Engineering Knowledge Test

## SCHEME AND SYLLABUS

Engineering Knowledge Test is a common test aimed at testing the Basic Engineering knowledge of the candidates applied for Aeronautical Engineering Courses. EKT has two parts, namely

**Part A** - General Engineering: 40 Questions

**Part B** - Specialist Paper for each Engineering discipline: 35 Questions

} Duration: 1 Hour

Engineering Knowledge Test is pitched at pre-final to final year engineering level. The test consists of two parts viz General Engineering and Specialist subjects for the two streams of Technical Branches i.e Aeronautical Engineering (Electronics) and Aeronautical Engineering (Mechanical).

The specialised papers are in Mechanical Engineering, Aeronautical engineering, Electronics and Communication engineering, Electrical and Instrumentation engineering and Computer Engineering.

The questions are objective type in nature and duration of test is approximately one hour. It is mandatory for the candidates to pass in both General and Specialist papers to qualify for AFSB interview.

# EKT SYLLABUS- GENERAL ENGINEERING

1. **Modern Physics:-** Quantum Mechanics, Electrical Conductivity in Metals, Dielectric and magnetic properties of materials, Lasers, Super Conductivity and optical fibers.

2. **Chemistry :-** Chemical Energy Sources, Solar Energy, Electrochemical Energy Systems, Battery Technology, Fuel Cell, Corrosion Science & Control, Metal finishing & Electroless Plating.

3. **Mathematics :-** Differential Calculus, Partial Differentiation, Integral Calculus & Application, Differential Equation, Vector Calculus & Infinite Series, Laplace Transform, Vector Integration, Integral Calculus.

4. **Computers :-** Computer peripherals, Data Processing, Data storage, Operation Systems, Networks of an Internets, Algorithms & Flow charts, Computer aided sketching.

5. **Electrical :-** DC Circuits, Electromagnetism, Single phase AC Circuits, Three phase Circuits, Measuring Instruments, Domestic Wiring, DC Machine Transformer, Synchronous Generation, Three phase Induction motor.

6. **Electronics :-** Semiconductors diodes, Transistor, SCR, Amp & oscillators, OP Amp, Communication Systems, Number System and Digital Logic.

7. **Mechanical Engineering :-** Energy & Steam, Turbines steam, Gas & Water, Internal combustion Engines, Refrigeration and Air Conditioning, Lathe & Drilling Machines, Milling & Grinding Machines, Joining Processes, Lubrication & Bearing , Power Transmission and workshop technologies.

# EKT SYLLABUS – COMPUTER AND ELECTRONICS

1. **Digital Electronic Circuits:-** Number representation and computer arithmetic (fixed and floating point),Boolean algebra and minimization of Boolean functions, Logic functions and logic gates, Minimization, Digital IC families (DTL, TTL, ECL, MOS, CMOS),Design and synthesis of combinational and sequential circuits, Combinational Circuits: arithmetic circuits, code converters, multiplexers, Decoders. Sequential circuits: latches and flip-flops, counters, shift-registers.

2. **Analog Electronic Circuits:** - Small Signal Equivalent circuits of diodes ,Simple diode circuits, clipping, clamping, rectifiers, Biasing and bias stability of transistor and FET amplifiers, Amplifiers, single-and multi-stage amplifiers, frequency response of amplifiers, Simple op-amp circuits, Sinusoidal oscillators and criterion for oscillation

**3. Computer Organization and Architecture:-** Machine instructions and addressing modes, Memory interface, Cache and main memory and Secondary storage. Microprocessor (8085): architecture and memory organisation.

**4. Operating System:-** Processes, Threads and Inter-process communication, Concurrency, Synchronization and Deadlock, CPU scheduling, Memory management and virtual memory, File systems and I/O systems, Protection and security.

**5. Programming and Data Structures:-** Programming in C and similar Structured programming languages. Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

**6. Databases:-** ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

**7. Computer Networks:-** ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers. Network security: basic concepts of public key and private key cryptography, digital signature, firewalls.

**8. Information Systems and Software Engineering:-** information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

# EKT SYLLABUS- MECHANICAL

**1. Engineering Mechanics :-** Equivalent force systems, free-body concepts, equations of equilibrium, trusses and frames, virtual work and minimum potential energy. Kinematics and dynamics of particles and rigid bodies, impulse and momentum (linear and angular), energy methods, central force motion.

**2. Strength of Materials :-** Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, shear force and bending moment diagrams, bending and shear stresses, deflection of beams torsion of circular shafts, thin and thick cylinders, Euler's theory of columns, strain energy methods, thermal stresses.

**3. Theory of Machines :-** Displacement, velocity and acceleration, analysis of plane mechanisms, dynamic analysis of slider-crank mechanism, planar cams and followers, gear tooth profiles, kinematics and design of gears, governors and flywheels, balancing of reciprocating and rotating masses.

**4. Vibrations :-** Free and forced vibration of single degree freedom systems, effect of damping, vibration isolation, resonance, critical speed of rotors.

**5. Fluid Mechanics:-** Fluid properties, fluid statics, manometry, buoyancy -- Control-volume analysis of mass, momentum and energy, fluid acceleration -- Differential equation of continuity and momentum -- Bernoulli's equation -- Viscous flow of incompressible fluids -- Boundary layer, Elementary turbulent flow -- Flow through pipes, head losses in pipes, bends etc.

**6. Heat Transfer :-** Modes of heat transfer -- One dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins -- Dimensionless parameters in free and forced convective heat transfer, Various correlations for heat transfer in flow over flat plates and through pipes -- Thermal boundary layer -- effect of turbulence -- Radiative heat transfer, black and grey surfaces, shape factors, network analysis -- Heat exchanger.

# EKT SYLLABUS - ELECTRONICS AND COMMUNICATION ENGINEERING

**1. 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, Waye-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.

**2. 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.

**3. 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.

**4. 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.

**5. Signals and Systems:** Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform. Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.

**6. Control Systems:** Basic control system components; block diagrammatic description, reduction of block diagrams. Open-loop and closed-loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

**7. Communications:** Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems:

amplitude and angle modulation and demodulation systems, spectral analysis of these operations, superheterodyne receivers; elements of hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Fundamentals of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers, bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA and GSM.

**8. Electromagnetics:** 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.

# EKT SYLLABUS – ELECTRICAL & INSTRUMENTATION ENGINEERING

**1. Electrical Circuits and Fields:-** Network graph, KCL, KVL, node/ cut set, mesh/ tie set analysis, transient response of d.c. and a.c. networks -- sinusoidal steady-state analysis -- resonance in electrical circuits -- concepts of ideal voltage and current sources, network theorems, driving point, immittance and transfer functions of two port networks, elementary concepts of filters --three phase circuits -- Fourier series and its application -- Gauss theorem, electric field intensity and potential due to point, line, plane and spherical charge distribution, dielectrics, capacitance calculations for simple configurations -- Ampere's and Biot-Savart's law, inductance calculations for simple configurations.

**2. Electrical Machines :-** Single phase transformer - equivalent circuit, phasor diagram, tests, regulation and efficiency -- three phase transformers - connections, parallel operation -- auto transformer and three-winding transformer -- principles of energy conversion, windings of rotating machines: D. C. generators and motors - characteristics, staring and speed control, armature reaction and commutation -- three phase induction motors -- performance characteristics, starting and speed control -- single-phase induction motors -- synchronous generators performance, regulation, parallel operation -- synchronous motors - starting, characteristics, applications, synchronous condensers -- fractional horse power motors, permanent magnet and stepper motors.

**3. Control Systems :-** Principles of feedback -- transfer function -- block diagrams: Signal flow graphs. Transient Response --steady-state errors -- stability-Routh and Nyquist criteria -- Bode plots -- compensation -- root loci -- time delay systems-- phase and gain margin elementary state variable formulation -- state transition matrix and response for LTI systems. Mechanical, hydraulic and pneumatic system components. Synchro pair, servo and step motors. On off, cascade, P, PI, P-I-D, feed forward and derivative controller, Fuzzy controllers.

**4. Electrical and Electronic Measurements :-** Transducers, Mechanical Measurement and Industrial Instrumentation: Resistive, Capacitive, Inductive and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity and acceleration (translational and rotational), force, torque, vibration and shock. Measurement of pressure, flow, temperature and liquid level. Measurement of pH, conductivity, viscosity and humidity. Bridges and potentiometers, PMMC moving iron, dynamometer and induction type instruments -- measurement of voltage, current, power, energy and power factor -- instrument transformers -- digital voltmeters and multimeters -- phase, time and frequency measurement -- Q-meter, oscilloscopes, potentiometric recorders, error analysis.

**5. Analog and Digital Electronics :-** Analog Electronics: Characteristics of diodes, BJT, FET, SCR -- amplifiers-biasing, equivalent circuit and frequency response -- oscillators and feedback amplifiers, operational amplifiers- characteristics and applications -- simple active filters -- Instrumentation amplifier-- precision rectifier-- V-to-I and I-to-V converter --oscillators and signal generators--VCOs and timers.Digital Electronics: Combinational logic circuits, minimization of Boolean functions. IC families, TTL, MOS and CMOS. Arithmetic circuits. Comparators, Schmitt trigger, timers and mono-stable multi-vibrator. Sequential circuits, flip-flops, counters, shift registers. Multiplexer, S/H circuit. Analog-to-Digital and Digital-to-Analog

converters. Basics of number system. Microprocessor applications, memory and input-output interfacing. Microcontrollers.

**6.** **Telecommunication Engineering :-** Signals, Systems and Communications: Periodic and aperiodic signals. Impulse response, transfer function and frequency response of first- and second order systems. Convolution, correlation and characteristics of linear time invariant systems. Discrete time system, impulse and frequency response. Pulse transfer function. IIR and FIR filters. Amplitude and frequency modulation and demodulation. Sampling theorem, pulse code modulation. Frequency and time division multiplexing. Amplitude shift keying, frequency shift keying and pulse shift keying for digital modulation.

# EKT STLLABUS - AE-AERONAUTICAL ENGINEERING (MECHANICAL)

**1. FLIGHT MECHANICS / AERODYNAMICS** :- Atmosphere, standard atmosphere, Properties, Pressure altitude, density altitude. Classification of aircraft. Airplane (fixed wing aircraft) configuration and various parts. Bernoulli's equation, static, dynamic pressure equivalent, calibrated, indicated air speeds, various corrections for airspeeds, Equations of equilibrium, work and energy, Incompressible flow, viscous flows, introduction to Reynolds number, Laminar turbulent flow, transition, Aerodynamic forces and moments, Lift, drag, centre of pressure, Primary flight instruments, Altimeter, ASI, VSI, Turn-bank indicator, gyroscope

**2. THERMODYNAMICS:-** Zeroth, First and Second laws of thermodynamics -- Thermodynamic system and processes -- Irreversibility and availability -- Behaviour of ideal and real gases, Properties of pure substances, calculation of work and heat Analysis of thermodynamic cycles related to energy conversion -- Carnot, Rankine, Otto, Diesel, Brayton and Vapour compression cycles.

**3. ENGINEERING MATERIALS :-** Structure and properties of engineering materials and their applications, heat treatment, fatigue and creep.

**4. STRUCTURES**:- Stress and Strain, Young's modulus, Poissons ratio, Equations of equilibrium, strain-displacement relationship, plane stress and strain. Classification of structures, preliminary, secondary and tertiary , stressed skin, Characteristics of aircraft structures and materials, torsion, bending and flexural shear. Flexural shear flow in thin-walled sections. Buckling. Failure theories. Loads on aircraft. V-n diagram

**5. PROPULSION** :- Thermodynamics, Theory of Aircraft Gas Turbine engines, Brayton cycle, Otto cycle, Classification of jet propulsion, turboprop, turbojet, turbofan etc., effect of speed, altitude, temperature etc thrust equation, propeller theory basics. Axial compressors and turbines, centrifugal pumps and compressors. Aerothermodynamics of non rotating propulsion components: Intakes, combustor and nozzle, Elements of rocket propulsion.

# SAMPLE QUESTION PAPER
# GENERAL ENGINEERING

1. Two free parallel wires carrying current in the opposite directions

   (a) Attract each other
   (b) Repel each other
   (c) Do not effect each other
   (d) Get rotated to be perpendicular to each other

   Ans.(b)

2. All the magnetic materials looses their magnetic property when

   (a) Dipped in water
   (b) Dipped in oil
   (c) Brought near piece of iron
   (d) Strongly heated

   Ans.(d)

3. Potassium paramagnet is used for

   (a) Dechlorination
   (b) Improving colour
   (c) Reducing acidity
   (d) Reducing hardness

   Ans.(b)

4. Which of the following material has the highest carbon percentage?

   (a) Cast iron
   (b) Mild steel
   (c) High carbon steel
   (d) Stainless steel

   Ans.(a)

5. Which of the following paints is most fire resistant

   (a) Bituminous paint
   (b) Asbestos paint
   (c) Aluminum paint
   (d) Synthetic paint

   Ans.(b)

6. The gas which is mainly responsible for the explosion in sewers is

(a) Methane
(b) Ethane
(c) Ammonia
(d) Carbon- monoxide

Ans.(d)

7. The Wind screen of car made of

(a) Sheet glass
(b) Wired glass
(c) Laminated glass
(d) Flint glass

Ans.(c)

8. Which of the welding process is used for welding of structures?

(a) Gas welding
(b) Fusion welding
(c) Thermic welding
(d) Arc welding

Ans.(d)

9. In a d.c generator, following losses will be minimum

(a) Copper loss
(b) Iron loss
(c) Friction loss
(d) Shunt field copper loss

Ans.(b)

10. Corona loss is less when the shape of the conductor is

(a) Circular
(b) Flat
(c) Oval
(d) Independent of shape

Ans.(a)

11. The core of the transformer is assembled with laminated sheet so as to reduce

(a) Hysteresis loss
(b) Copper loss
(c) Magnetic noise
(d) Eddy current loss

Ans.(d)

12. Which of the following instrument is used for measuring the rate of flow of liquid of pipes

(a) Hydro meter
(b) Venturi meter
(c) Viscometer
(d) Falter pump

Ans.(b)

13. The proper use of lubricants cannot reduce

(a) Static friction
(b) Inertia
(c) Sliding friction
(d) Rolling friction

Ans.(b)

14. Infra red radiation can be detected by

(a) Spectrometer
(b) Pyrometer
(c) Nanometer
(d) Photometer

Ans.(b)

15. Which of the following is used in optical fibers

(a) Total internal reflection
(b) Scattering
(c) Diffraction
(d) Refraction

Ans.(a)

16. Metal attains super- conduction properties below the temperature of

(a) 0 deg K
(b) 100 deg C
(c) 100 deg K
(d) 10 deg K

Ans.(d)

17. Powder clinges to the skin because of following property

(a) Adhesion
(b) Cohesion
(c) Surface tension
(d) Capillary action

Ans.(a)

18. The sparking at the brushes in the d.c generator is attributed to

(a) Quick reversal of current
(b) Reactance voltage
(c) Armature reaction
(d) High resistance of the brushes

Ans.(c)

19. D.C series motor should always be started with load because

(a) At no load it will rotate at dangerously high speed
(b) At no load it will not develop high starting torque
(c) It cannot start without load
(d) It draw a small amount of current at no load

Ans.(a)

20. A tunnel diode is

(a) High resistivity p-n junction diode
(b) A slow switching device
(c) An amplifying device
(d) A very heavily doped p-n junction diode

Ans.(d)

21. The effective channel length of a MOSFET in saturation decreases with increase in

(a) Gate voltage
(b) Drain voltage
(c) Source voltage
(d) Body voltage

Ans. (b)

22. The ON voltage and forward breakover voltage of an SCR depends on the

(a) Gate current alone
(b) Band gap of the semiconductor alone
(c) Gate current and the semiconductor band gap respectively
(d) Semiconductor bandgap and the gate current respectively

Ans.(c)

23. Negative feedback in amplifier

(a) Improves the signal to noise ratio at the input
(b) Improves the signal to noise ratio at the output
(c) Does not affect the signal to noise ratio at the output
(d) Reduce the distortion.

Ans.(b)

24. An ideal Op- Amp is an ideal

(a) Voltage controlled current source
(b) Voltage controlled voltage source
(c) Current controlled current source
(d) Current controlled voltage source

Ans.(b)

25. One of the following types of noise becomes of great importance at high frequencies. It is the

(a) Shot noise
(b) Random noise
(c) Impulse noise
(d) Transit- time noise

Ans.(d)

26. Piezoelectricity effect is the polarization of a dielectric under the influence of

(a) Light
(b) Mechanical stress
(c) Electrical stress
(d) Heat

Ans.(b)

27. Entropy of mixture of two gases after sudden mixing is

(a) Greater than
(b) Less than
(c) Same as sum of entropy of individual gases
(d) Unpredictable

Ans.(a)

28. If air filter is removed in a petrol engine, the air/fuel ratio will

(a) Increase
(b) Decrease
(c) Increase and decrease
(d) Remains unchanged

Ans.(a)

29. In a two stage compression , inter -cooling is used for

(a) Reducing work of compression in the first stage
(b) Reducing temperature in the first stage
(c) Reduced work in the second stage
(d) Reducing work and temperature in the second stage

Ans.(d)

30. Which component of refrigeration system controls the flow of refrigerant

(a) Expansion valve
(b) Condenser
(c) Compressor
(d) Evaporator

Ans.(a)

31. Laser beam welding has widest application in

(a) Mass production in heavy industry
(b) Jobbing industry
(c) Electronic industry
(d) Structure and bridge work

Ans.(c)

32. In Equation x-2y+3z=0 and 2x+5y+3z=0, y equals

(a) 0
(b) 1
(c) 2
(d) 3

Ans.(a)

33. If a system of equation has one or more solution it is called

(a) Compatible
(b) Consistent
(c) Homogeneous
(d) Simultaneous

Ans.(b)

34. In a microprocessor the register which holds the address of the next instruction to be fetched is

(a) Accumulator
(b) Program counter
(c) Stack pointer
(d) Instruction register

Ans.(b)

35. The mnemonics used in writing a program is called

(a) Assembly language
(b) Fetch cycle
(c) Microinstruction
(d) Object program

Ans.(a)

36. For which of the following devices, is DMA the most suitable

(a) Keyboard
(b) Mouse
(c) Joy stick
(d) Hard stick

Ans.(d)

37. In real time operating system, which of the following is the most suitable scheduling scheme?

(a) Round robin
(b) First come first served
(c) Random scheduling
(d) Preemptive

Ans.(d)

38. In client –server system , data is usually stored on the

(a) Server
(b) Client
(c) Network
(d) None of the above

Ans.(a)

39. Identify the natural

(a) LISP
(b) PROLOG
(c) Both (a) and (b)
(d) Neither (a) and (b)

Ans.(c)

40. An interrupt that can temporarily ignored by the counter is known as

(a) Vectored interrupt
(b) Non – maskable interrupt
(c) Maskable interrupt
(d) Low priority interrupt

Ans.(c)

# SAMPLE QUESTION PAPER
# COMPUTER AND ELECTRONICS

1. Binary means.....

   (a) Three
   (b) Four
   (c) Two
   (d) None of the above.

   Ans: (c)

2. The digits used in a binary systems are ……and …..

   (a) 9 and 0
   (b) 0 and 1
   (c) 1 and 2
   (d) None of the above

   Ans.: (b)

3. The hexadecimal number system is widely used in analyzing and programming

   (a) Registers
   (b) Chips
   (c) Microprocessors
   (d) None of the above.

   **Ans: (c)**

4. The hexadecimal digits are 0 to 9 and A to.....

   (a) E
   (b) F
   (c) G
   (d) None of the above

   **Ans: (b)**

5. Which of the following input combinations is not allowed in an SR flip-flop?
   (a) S = 0, R = Q
   (b) S = 0, R = l
   (c) S = l, R = l
   (d) None of the above.

   **Ans: (c)**

6. When an inverter is placed between both inputs of an SK flip-flop, the resulting flip-flop is

(a) JK flip-flop
(b) D flip-flop
(c) Master slave JK flip-flop
(d) None of the above.

**Ans (b)**

7. The clock signals are used in sequential logic circuits

(a) To tell the time of the day
(b) To tell how much time has elapsed since the system was turned on
(c) To synchronize events in various parts of a system
(d) None of the above.

**Ans: (c)**

8. What logic function is obtained by adding an inverter to the output of an AND gate?

(a) OR
(b) NAND
(c) XOR
(d) None of the above.

**Ans: (b)**

9. The simplified form of the Boolean expression (X + Y+XY) (X + Z) is

(a) X+Y+Z
(b) XY+YZ
(c) X+YZ
(d) None of the above.

**Ans: (c)**

10. The 1's compliment of binary number 11010 is:

(a) 00101
(b) 00010
(c) 00110
(d) None of the above.

**Ans: (a)**

11. The TWO's compliment of binary number 0.01011 is :

(a) 1.10101
(b) 0.10101
(c) 1.10100
(d) None of the above.

**Ans: (a)**

12. A half-adder is also known as:

(a) AND circuit
(b) NOR circuit
(c) EX-ORcircuit
(d) None of the above.

**Ans:(c)**

13. The register which contains the instruction that is to be executed is known as

(a) Index register
(b) Instruction registers
(c) Memory address register
(d) None of the above.

**Ans: (a)**

14. The input unit of a computer

(a) Feeds data to the CPU or memory
(b) Processor and I/O devices
(c) Directs all other units
(d) None of the above

**Ans: (a)**

15. Which of the following is used as storage location both in the ALU and the control section of a computer?

(a) Accumulator
(b) Register
(c) Adder
(d) None of the above

**Ans: (b)**

16. One of the main feature that distinguish microprocessors from micro-computers is

(a) Words are usually larger in micro-processors
(b) Words are shorter in micro-processors
(c) Microprocessor does not contain I/O devices
(d) None of the above.

**Ans: (c)**

17. The process of fetching and executing instructions, one at a time, in the order of increasing addresses is known as

(a) Instruction execution
(b) Straight line sequencing
(c) Instruction fetches
(d) None of the above.

**Ans: (b)**

18. The ALU of a computer normally contains a number of high speed storage elements called

(a) Semiconductor memory.
(b) Registers.
(c) Hard disk.
(d) None of the above.

**Ans: (b)**

19. The process of executing several programms simultaneously by use of more than one processing unit is known as:

(a) Multi programming.
(b) Multiprocessing.
(c) Time sharing.
(d) None of the above

**Ans: (b)**

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20. The programme which is run on one computer and which initiates the operation of another computer is known as

(a) compiler.
(b) Interpreter.
(c) Simulator.
(d) None of the above.

**Ans: (c)**

21. The system which permits a large number of users at various remote terminals to simultaneously use a centrally located computer is known as

(a) Servomechanism system.
(b) Time sharing system.
(c) Mainframe system.
(d) None of the above.

**Ans: (b)**

22. A software programme stored in a ROM that cannot be changed easily is known as

(a) Hardware.
(b) Linker
(c) firmware.
(d) None of the above

**Ans; (c)**

23. Which of the following operating systems use write through cache?

(a) UNIX
(b) DOS
(c) ULTRIX
(d) None of the above

**Ans: (b)**

24. The operating system manages

(a) Memory.
(b) Processor.
(c) Disk and I/O devices.
(d) All of the above.

**Ans: (d)**

25. Situations where two or more processes are reading or writing some shared data and final result depends on who runs precisely are called

(a) Race conditions.
(b) Critical sections.
(c) Mutual sections.
(d) None of the above.

**Ans: (a)**

26. Part of a programme where the shared memory is accessed and which should be executed indivisibly, is called

(a) Semaphores.
(b) Mutual Exclusion.
(c) Critical section.
(d) None of the above.

**Ans: (c)**

27. Non-modifiable procedures are called

(a) Serially usable procedures.
(b) Top down procedures.
(c) Re-entrant procedures.
(d) None of the above.

**Ans; (c)**

28. Round robin scheduling is essentially the preemptive version of

(a) FIFO.
(b) Shortest job first.
(c) Shortest remaining time.
(d) None of the above.

**Ans: (a)**

29. In C programming language, which of the following types of operators have the highest precedence?

(a) Relational operators.
(b) Equality operators.
(c) Arithmetic operators
(d) None of the above

**Ans: (c)**

30. In C programming language, which of the following type of operators have the highest precedence

(a) Relational operators.
(b) Equality operators.
(c) Arithmetic operators.
(d) None of the above.

**Ans; (c)**

31. In C programming language, if the first and the second operands of operator + are of types int and float, respectively, the result will be of type

(a) Int
(b) Float
(c) char
(d) None of the above

**Ans: (b)**

32. In C programming language, how many parameters can be passed to a function ?

(a) one
(b) two
(c) As many parameters as are defined in the function definition
(d) none of the above

Ans. (c)

33. In a Network Sending a bad routing information (like network unreachable) back to the originating router is called

(a) Split horizon
(b) Route Poisoning
(c) Reverse poisoning
(d) None of the above

**Ans; (c)**

34. In order to route data packets a router must know which of the following?

(a) Possible routes to all remote networks
(b) Neighbor routers from which it can learn about remote networks
(c) Destination Address
(d) All of these

**Ans: (d)**

35. An example of a malicious program that needs a host program is

(a) Logic Bomb
(b) Worm
(c) Bug
(d) None of these.

**Ans: (a)**

**SAMPLE QUESTION PAPER**
**MECHANICAL**

1. The resultant of a force acting on a body will be zero if the body

   (a) Rotate with uniform deceleration
   (b) Rotate with uniform acceleration
   (c) Does not rotate
   (d) Rotates

   Ans: (c)

2. The movement of a force

   (a) Occurs about a point
   (b) Measures the capacity to do useful work
   (c) Occurs only when bodies are in motion
   (d) Measures the ability to produce turning or twisting about an axis

   Ans: (d)

3. After reaching the yielding stage while testing a mild steel specimen strain

   (a) Becomes constant
   (b) Strain start decreasing
   (c) Increasing without any increase in load
   (d) Non of the above

   Ans: (c)

4. Volumetric strain for a rectangular of length L, breadth B, and thickness T subjected to a pull of P is given by

   (a) e (1-2m)
   (b) e (1-2/m)
   (c) e (m-2)
   (d) e (2/M-1)

   Ans: (b)

5. The mechanism used in petrol engine is

   (a) Crank mechanism
   (b) Slider mechanism
   (c) Slider crank mechanism
   (d) Natural lines and circular

   Ans: (c)

6. M 10 screws have a pitch of

(a) 0.5 mm
(b) 1.25 mm
(c) 2.50 mm
(d) 5.00 mm

Ans: (b)

7. A coarse screw of major diameter 6.00 mm and pitch is designated as

(a) 1x6M
(b) Coarse M 6
(c) M 6
(d) 6Mx6x1

Ans: (c)

8. Longitudinal vibration are set to occur when the particles of a body moves.

(a) Perpendicular to its axis
(b) Parallel to its axis
(c) In a circle about its axil
(d) None of these

Ans: (b)

9. A mass of 1 Kg is attached to the end of a sprig with stiffness 0.7 N/mm.. The critical damping coefficient of the system is

(a) 1.40 Ns/m
(b) 18.522 Ns/m
(c) 52.92 Ns/m
(d) 529.20 Ns/m

Ans: (c)

10. An ideal fluid is

(a) Similar to a perfect gas
(b) Friction less and incompressible
(c) One which obeys Newtons laws of viscosity
(d) One which satisfies continuity equation
(e) One which flows through pipes with least friction

Ans: (b)

11. The stress Strain relation of the Newtonian fluids is

(a) Linear
(b) Parabolic
(c) Hyperbolic
(d) Involutic

Ans: (a)

12. The Reynolds No. may be defined as the ration of

(a) Viscous forces to inertial forces
(b) Elastic forces to pressure forces
(c) Viscous forces to gravity forces
(d) None of the above

Ans: (d)

13. All heat transfer processes

(a) Involve transfer of energy
(b) Involve temperature difference between the bodies
(c) Obeys the first law of the thermodynamics
(d) Obeys second law of thermodynamics

Ans: (b)

14. Which insulating material is a suitable low temperature application?

(a) Cork
(b) Asbestos paper
(c) Diatomaceous earth
(d) 85 % magnesia

Ans: (c)

15. A heat exchanger that can remove fix quantity of heat form a system is available where should it be installed for best economy

(a) Prior to first stage compression
(b) As intercooler
(c) After final stage compression
(d) Depends upon size of installation

Ans: (a)

16. The performance of air compressor at high altitudes as compared to that at sea level will be

(a) Better
(b) Same
(c) Inferior
(d) Will depend upon temperature of air

Ans: (c)

17. Which is incorrect?

(a) Compression ration= Initial volume +final Volume
(b) Final pressure= Initial Pressure x Compression ration
(c) Initial pressure= Final pressure+Compression ration
(d) None of the above

Ans: (d)

18. During adiabatic compression

(a) No heat leaves or enters the system
(b) Maximum work is done
(c) Specific heat remains constant
(d) Temperature remains constant

Ans: (a)

19. In multistage turbines by introducing reheating

(a) Thermal efficiency improves
(b) The output of turbine increases
(c) Work done by compressor reduces
(d) The ratio compressor work/turbine decreases

Ans: (a)

20. In Jet engine the compression ration

(a) Varies with altitude
(b) Varies with square of speed
(c) Varies as cube of speed
(d) remains constant

Ans: (b)

21. An axial flow compressor has

(a) Larger blade at gas entry and smaller blades at exit
(b) Smaller blade at gas entry and larger blades at exit
(c) Identical blades at exit as well as entry
(d) Size of blades remains same only angles changes

Ans: (a)

22. An axial flow compressor is suitable for

(a) High volume flow rates with a small pressure rise
(b) High volume flow rate with high pressure rise
(c) Low volume flow rates with low pressure rise
(d) Low volume flow rates with high pressure rise

Ans: (c)

23. Thermal efficiency of a gas turbine cycle can be improved by

(a) Reheating between the expansion stage
(b) Intercooling between compression stages
(c) Regeneration
(d) Any of the above

Ans: (d)

24. Gas turbine used in aircraft is of

(a) Open cycle type
(b) Closed cycle type with reheating
(c) Closed cycle type with reheating and regeneration
(d) Open cycle type with reheating, regeneration and intercooling

Ans: (a)

25. In a nozzle under choked flow conditions pressures waves travel, in the divergent portion, at

(a) Subsonic speed
(b) Sonic speed
(c) Super sonic
(d) Subsonic to supersonic speed

Ans: (b)

26. In a nozzle if back pressure is equal to inlet pressure

(a) No flow occurs
(b) Maximum flow occurs
(c) Flow is subsonic in diverging section
(d) Flow is supersonic in convergent section as well as supersonic section

Ans: (b)

27. The flow on two sides of a normal shock wave is

(a) Subsonic
(b) Sonic
(c) Supersonic
(d) Supersonic on one side and subsonic on the other side

Ans: (d)

28. The diverging portion of the nozzle acts as a diffuser for

(a) Subsonic flow
(b) Supersonic flow
(c) Both the subsonic as well as supersonic flow
(d) None of the above

Ans: (a)

29. Identify the correct statement

(a) All materials undergo plastic deformation
(b) A completely brittle material would not fracture at elastic limit
(c) Brittleness is an important engineering consideration, because it allows the material to be redistribute localize stresses.
(d) A metal which is brittle in tension may be ductile under hydro static compression

Ans: (d)

30. The defect responsible for the phenomenon of slip by which most metals deform plastically, is known as

(a) Fracture
(b) Twining
(c) Dislocation
(d) Strain hardening

Ans: (c)

31. Fatigue failure occurs when a part is subjected to

(a) Tensile stress
(b) Compressive stress
(c) Torsion
(d) Fluctuating stress

Ans:(d)

32. Stress concentration occurs when

(a) A body is subjected to excessive stress
(b) A body is subjected to unidirectional stress
(c) A body is subjected to fluctuating stress
(d) A body is subjected to non uniform stress distribution

Ans: (d)

33. Stress concentration may be caused by

(a) Change in cross sectional area
(b) Change in shape
(c) Change in dimension
(d) A hole or a notch in the body

Ans:(d)

34. The inability of a body to change its state of rest or uniform motion along a straight line is called its

(a) Momentum
(b) Velocity
(c) Acceleration
(d) Inertia

Ans: (d)

35. A material subjected to reversal of stresses does not fail at a stress known as

(a) fatigue stress
(b) Proof stress
(c) Safe stress
(d) Endurance stress

Ans: (d)

**EKT SAMPLE PAPER**
**ELECTRONICS AND COMMUNICATION ENGINEERING**

1. A master-slave flip-flop has the characteristic that

(a) Change in the input immediately reflected in the output
(b) Change in the output occurs when the state of the master is affected
(c) Change in the output occurs when the state of the slave is affected
(d) Both the master and the slave states are affected at the same time

**Ans.: (c)**

2. A digital-to-analog converter with a full-scale output voltage of 3.5 V has a resolution close to 14m V. Its bit size is

(a) 4
(b) 8
(c) 16
(d) 32

**Ans.: (b)**

3. The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the $TE_{10}$ mode is

(a) Equal to its group velocity
(b) Less than the velocity of light in free space
(c) Equal to the velocity of light in free space
(d) Greater than the velocity of light in free space

**Ans.: (d)**

4. An ideal op-amp is an ideal

(a) voltage controlled current source
(b) voltage controlled voltage source
(c) current controlled current source
(d) current controlled voltage source

**Ans.: (b)**

5. Which one of the following filters has highest Q (Quality Factor)

(a) Mechnical Filter
(b) Garnet Filter
(c) Atomic Filter
(d) Quartz Filter

**Ans. : (c)**

6. The 8085 assembly language instruction that stores the content of H and L registers into the memory locations 2050H and 2051H, respectively, is

(a) SPHL $2050_H$
(b) SPHL$2051_H$
(c) SHLD $2050_H$
(d) STAX $2050_H$

**Ans.: (c)**

7. What is the primary function of multiplexing?

(a) To match the frequency range of a signal to a particular channel.
(b) To reduce the bandwidth of a signal.
(c) To select one radio channel from a wide range of transmitted channels.
(d) To allow a number of signals to make use of a single communications channel.

**Ans.: (d)**

8**.** Colpitts oscillator is an electrical dual of

(a) Hartley Oscillator
(b) Clapp Oscillator
(c) Pierce Oscillator
(d) Armstrong Oscillator

**Ans. : (a)**

9. The bandgap of Germanium at room temperature is

(a) 1.3 eV
(b) 0.7 eV
(c) 1.1 eV
(d) 1.4 eV

**Ans.: (b)**

10. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

(a) 8/6
(b) 12
(c) 16
(d) 8

**Ans.: (c)**

11. Which of the following is not included in the process of reception

(a) Decoding
(b) Encoding
(c) Storage
(d) Interpretation

**Ans.: (b)**

12. One of the following types of noise becomes of great importance at high frequencies beyond GHz ranges. It is the

(a) Shot noise
(b) Impulse noise
(c) Random noise
(d) Transit–time noise

**Ans.: (d)**

13. A carrier wave is simultaneously modulated by two sine wave with modulation indices of 0.3 and 0.4. The total modulation index will be

(a) 1
(b) Cannot be calculated unless phase relation is known
(c) 0.5
(d) 0.7

**Ans.: (c)**

14. One of the following cannot be used to remove the unwanted sideband in SSB modulation. It is the

(a) Filter method
(b) Phase-shift method
(c) Third method
(d) Balanced modulator

**Ans.: (d)**

15. Indicate which one of the following is not an advantage of FM over AM

(a) Better noise immunity is provided
(b) Lower bandwidth is required
(c) The transmitted power is more useful
(d) Less modulating power is required

**Ans.: (b)**

16. A super heterodyne receiver with an IF of 450 kHz is tuned to a signal at 1200 kHz. The image frequency in this case would be

(a) 750 kHz
(b) 900 kHz
(c) 1650 kHz
(d) 2100 kHz

**Ans.: (d)**

17. Indicate the false statement. The SWR on a transmission line is infinity; the line is terminated in

(a) a short circuit
(b) a complex impedance
(c) an open circuit
(d) a pure reactance

**Ans.: (b)**

**18.** For the equation, $s^3 - 4s^2 + s + 6 = 0$ , the number of roots in the left half of s-plane will be

(a) 0
(b) 1
(c) 2
(d) 3

**Ans. : (c)**

19. The noise voltage across a resistor maintained at an absolute temperature T

(a) is directly proportional to the Resistance
(b) is directly proportional to the square of the resistance
(c) is directly proportional to the square root of the resistance
(d) is directly proportional to the bandwidth of measurement

**Ans.: (c)**

20. If the noise figure and gain of the three stages of a three stage amplifier are $(F_1, G_1) = (4, 10)$, $(F_2, G_2) = (11, 10)$ and $(F_3, G_3) = (101, 10)$ respectively. The overall noise figure of the amplifier will be

(a) 4.6
(b) 6
(c) 6.6
(d) 11.6

**Ans.: (b)**

21. The dominant mode of propagation is preferred with rectangular waveguides because (indicate the false statement)

(a) It leads to smallest waveguide dimensions
(b) The resulting impedance can be matched directly to coaxial lines.
(c) It is easier to excite than the other modes
(d) propagation of it without any spurious generation can be ensured

**Ans.: (a)**

22. The Shannon-Hartley law:

(a) refers to distortion
(b) defines bandwidth
(c) describes signaling rates
(d) refers to noise

**Ans.: (c)**

23. The primary purpose of the helix in a Travelling Wave Tube (TWT) is to:

(a) Prevent the electron beam from spreading in the long tube
(b) Reduce the axial velocity of the RF field
(c) Ensure broadband operation
(d) Reduce the Noise Figure

**Ans.: (b)**

24. A non degenerate parametric amplifier has an input frequency $f_i$ and a pump frequency $f_p$. The idler frequency is:

(a) $f_i$
(b) $2f_i$
(c) $f_i - f_p$
(d) $f_p - f_i$

**Ans.: (d)**

25. Indicate which of the systems is digital:

(a) pulse position modulation
(b) pulse code modulation
(c) pulse width modulation
(d) pulse frequency modulation

**Ans.: (b)**

26. Biggest disadvantage of PCM is:

(a) Its inability to handle analog signals
(b) the higher error rate which its quantizing noise introduces
(c) its incompatibility with TDM
(d) the large bandwidth that are required for it

**Ans.: (d)**

27. Full duplex operation:

(a) requires two pairs of cables
(b) can transfer data in both directions at once
(c) requires modems at both ends of the circuit
(d) all of the above

**Ans.: (d)**

28. The maximum power that may be handled by a ferrite component at microwave frequencies is limited by the**:**

(a) Curie Temperature
(b) Saturation Magnetisation
(c) Line Width
(d) Gyrometric Resonance

**Ans.: (a)**

29. Telephone traffic is measured:

(a) With echo cancellers
(b) By the relative congestion
(c) In terms of the grade of service
(d) In Erlangs

**Ans.: (d)**

30. The Field Effect Transistors has following characteristics:

(a) Its operation depends on flow of majority carriers only.

(b) It exhibits low input resistance

(c) It is more noisy than a BJT

(d) All of the above

**Ans. : (a)**

31. The term power budgeting in optical communication refers to:

(a) The cost of cable, connecters, equipment, and installation
(b) loss of power due to defective components
(c) Total power available minus the attenuation losses
(d) comparative costs of fiber and copper installations

**Ans.: (c)**

32. Interlacing is used in television to:

(a) produce the illusion of motion
(b) ensures that all the lines on the screen are scanned, not nearly the alternate ones
(c) simplify the vertical sink pulse train
(d) avoid flicker

**Ans.: (d)**

33. The term power budgeting in optical communication refers to:

(a) The cost of cable, connecters, equipment, and installation
(b) loss of power due to defective components
(c) Total power available minus the attenuation losses
(d) comparative costs of fiber and copper installations

**Ans.: (c)**

34. The terms single mode and multi mode in optical fiber are best described as:

(a) The number of fibers placed into a fiber optic cable
(b) number of voice channels each fiber can support
(c) number of wavelengths each fiber can support
(d) the index number

**Ans. : (c)**

35. The code which provides for parity checks is:

(a) Baudot
(b) EBCDIC
(c) ASCII
(d) CCITT-2

**Ans. : (c)**

**EKT SAMPLE PAPER**
**ELECTRICAL AND INSTRUMENTATION ENGINEERING**

1. The basic requirement of a dc armature winding is that it must be

(a) Closed one
(b) Lap winding
(c) Wave winding
(d) Either (b) or (c)

**Ans. (a).**

2. A hydraulic turbine having rated speed of 250 rpm is connected to a synchronous generator. In order to produce power at 50 Hz, the number of poles required in the generator are: -

(a) 6
(b) 12
(c) 16
(d) 24

**Ans. (d).**

3. The following motor definitely has a permanent magnet rotor

(a) DC commutator motor
(b) Brushless dc motor
(c) Stepper motor
(d) Reluctance motor

**Ans. (c).**

4. A 500 MW 3-phase Y-connected synchronous generator has a rated voltage of 21.5 kV at 0.85pf. The line current when operating at full load rated conditions will be

(a) 13.43 kA
(b) 15.79 kA
(c) 23.25 kA
(d) 27.36 kA

**Ans. (b).**

5. Total instantaneous power supplied by a 3-phase ac supply to a balanced R-L load is

(a) Zero
(b) Constant
(c) Pulsating with zero average
(d) Pulsating with non-zero average

**Ans. (b)**

6. In relation to the synchronous machines, which one of the following statements is false?

(a) In salient pole machines, the direct-axis synchronous reactance is greater than the quadrature-axis synchronous reactance.
(b) The damper bars help the synchronous motor self-start.
(c) Short circuit ratio is the ratio of the field current required to produce the rated voltage on open circuit to the rated armature current.
(d) The V-curve of a synchronous motor represents the variation in the armature current with field excitation, at a given output power.

**Ans. (c).**

7. For the equation, $s^3 - 4s^2 + s + 6 = 0$, the number of roots in the left half of s-plane will be

(a) 0
(b) 1
(c) 2
(d) 3

**Ans. (c)**

8. A bipolar junction transistor (BJT) is used as a power control switch by biasing it in the cut-off region (OFF state) or in the saturation region (ON state). In the ON state, for the BJT

(a) Both the base-emitter and base-collector junctions are reverse biased.
(b) The base-emitter junction is reverse biased, and the base-collector junction is forward biased.
(c)The base-emitter junction is forward biased, and the base-collector junction is reverse biased.
(d) Both the base-emitter and base-collector junctions are forward biased.

**Ans. (d)**

9. The Q - meter works on the principle of

(a) Mutual inductance
(b) Self inductance
(c) Series resonance
(d) Parallel resonance

**Ans. (c)**

10. The series field of a short shunt dc generator is excited by _____ currents.

(a) shunt
(b) armature
(c) load
(d) external

**Ans. (c)**

11. The conduction loss versus device current characteristic of a power MOSFET is best approximated by

(a) a parabola
(b) a straight line
(c) a rectangular hyperbola
(d) an exponentially decaying function

**Ans. (a)**

12. A digital-to-analog converter with a full-scale output voltage of 3.5 V has a resolution close to 14 mV. Its bit size is

(a) 4
(b) 8
(c) 16
(d) 32

**Ans. (b).**

13. The output voltage waveform of a three-phase square-wave inverter contains

(a) Only even harmonics
(b) Both odd and even harmonics
(c) Only odd harmonics
(d) Only triple harmonics

**Ans. (c).**

14. In dc generators, the effect of armature reaction on the main pole flux is to

(a) Reduce it
(b) Distort it
(c) Reverse it
(d) Both a & b

**Ans. (d).**

15. The following terms used in the context of an instrument are numbered as shown: (i) accuracy, (ii) sensitivity, (iii) precision and (iv) resolution
Match these with their possible definitions listed below
P. Repeatability of readings on successive observations
Q. Smallest perceptible change in the output
R. Deviation of the output from the true value
S. Minimum value of the input from the true value
T. Ratio of the change in the instrument reading to the change in the measured variable.

(a) 1-P, 2-Q, 3-R, 4-S
(b) 1-S, 2-Q, 3-P, 4-T
(c) 1-R, 2-T, 3-P, 4-Q
(d) 1-T, 2-Q, 3-P, 4-R

**Ans. (c).**

16. An amplifier of gain 10, with a gain-bandwidth product of 1 MHz and slew rate of 0.1 V/s is fed with a10 KHz symmetrical square wave of ± 1 V amplitude. Its output will be

(a) ± 10 V amplitude square wave
(b) ± 2.5 V amplitude square wave
(c) ± 10 V amplitude triangular wave
(d) ± 2.5 V amplitude triangular wave

**Ans. (c).**

17. Binary means.....

(a) Three
(b) Four
**(c) Two**
(d) None of the above.

**Ans. (c)**

18. The digits used in a binary number system are …...and …..

(a) 9 and 0
(b) 0 and 1
(c) 1 and 2
(d) None of the above

**Ans. (b).**

19. The clock signals are used in sequential logic circuits

(a) To tell the time of the day
(b) To tell how much time has elapsed since the system was turned on
(c) To synchronize events in various parts of a system
(d) None of the above.

**Ans. (c).**

20. The 3-dB cut-off frequency of a first analog high pas filter is $_c$ the output will have a phase shift of

(a) $-\pi/2$
(b) $-\pi/4$
(c) $\pi/2$
(d) $\pi/4$

**Ans. (b).**

21. A 3 ½ digit multimeter has an accuracy specification of (± 0.5% of reading ± 5 counts). If the meter reads 2.00 mA on a full scale of 20mA, the worst-case error is

(a) 0.5%
(b) 2.5%
(c) 3.0%
(d) 5.5%

**Ans. (c).**

22. Consider the following systems: System 2: G(s) = $1/2(2S+1)$

System 1: G(s) = $1/2(5S+1)$

The true statement regarding the system is

(a) Bandwidth of system 1 is greater than the bandwidth of system 2.
(b) Bandwidth of system 1 is lower than the bandwidth of system 2.
(c) Bandwidth of both the systems are the same.
(d) Bandwidth of both the systems are infinite.

**Ans. (a).**

23. Three DC currents $I_1$, $I_2$ and $I_3$ meet at a node with $I_1$entering and $I_2$ and $I_3$ leaving the node. $I_1$ and $I_2$ are measured as 100mA and 99 mA with a ± 1% accuracy. Then the value of $I_3$ and the accuracy of $I_3$ are

(a) 1 mA ± 20%
(b) 199 mA ± 2%
(c) 1 mA ± 2%
(d) 1 mA ± 199%

**Ans. (c).**

24. As compared to oscillators, inverters provide

(a) Distorted o/p
(b) Highly stabilized o/p
(c) Low freq o/p
(d) None of the above

**Ans. (c).**

25. Two copper-constantan thermocouples are connected such that the two constantan wires are joined together. The two copper wires are connected to the input of a low noise chopper stabilized differential amplifier having a gain of 1000. One of the thermocouple junctions is immersed in a flask containing ice and water in equal proportion. The other thermocouple is at a temperature T. If the output of the amplifier is 2.050V, the temperature T is

(a) 205°C
(b) 102.5°C
(c) 51.25°C
(d) 50°C

**Ans. (d).**

26. For a first order instrument a 5% settling time is equal to

(a) Three times the time constant.
(b) Two times the time constant.
(c) The time constant.
(d) Time required for the output signal to reaches 5% of the final value.

**Ans. (a).**

27. A twisted pair of wires is used for connecting the signal source with the instrumentation amplifier, as it helps reducing

(a) The effect of external interference.
(b) The error due to bias currents in the amplifier.
(c) The loading of the source by the amplifier.
(d) The common mode voltage.

**Ans. (c).**

28. A second order feedback system is found to be oscillating with a high frequency. The oscillations

(a) Can be reduced by increasing the proportional action.
(b) Can be reduced by increasing the integral action.
(c) Can be reduced by increasing the derivative action.
(d) Cannot be reduced.

**Ans. (b).**

29. A master-slave flip-flop has the characteristic that

(a) Change in the input immediately reflected in the output.
(b) Change in the output occurs when the state of the master is affected.
(c) Change in the output occurs when the state of the slave is affected.
(d) Both the master and the slave states are affected at the same time.

**Ans. (c).**

30. The cascade amplifier is a multistage configuration of

(a) CC-CB
(b) CE-CB
(c) CB-CC
(d) CE-CC

**Ans. (b).**

31. A phase lag compensation coil

(a) Improves relative stability
(b) Increases bandwidth
(c) Increases overshoot
(d) None of the above

**Ans. (c).**

32. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

(a) 8/6
(b) 12
(c) 16
(d) 8

**Ans. (c).**

33. A device with input x (t) and output y (t) is characterized by: $y(t) = x^2(t)$. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

(a) 370 kHz
(b) 190 kHz
(c) 380kHz
(d) 95kHz

**Ans. (c).**

34. An ideal op-amp is an ideal

(a) voltage controlled current source
(b) voltage controlled voltage source
(c) current controlled current source
(d) current controlled voltage source

**Ans. (b).**

35. Meggar is an instrument used for measuring

(a) current
(b) voltage
(c) insulation resistance
(d) power

**Ans. (c).**

# SAMPLE QUESTION PAPER
# AERONAUTICAL ENGINEERING

1. Which of the following is a scalar quantity

   (a) velocity of a gear
   (b) acceleration of a car
   (c) force in friction
   (d) area of a triangle

   Ans: (d)

2. Separation of flow is caused by

   (a) reduction of pressure in the direction flow
   (b) decrease in the boundary layer thickness
   (c) I ncrease of velocity in the direction of flow
   (d) adverse pressure gradient

   Ans: (d)

3. A pitot tube senses

   (a) stagnation pressure
   (b) average pressure
   (c) maximum pressure
   (d) velocity head pressure

   Ans: (a)

4. The Bernoulli's equation talks about

   (a) Energy transfer from one form to another
   (b) Energy and mass transfer
   (c) Mass transfer of fluids
   (d) None of the above

   Ans: (a)

5. The process in which pressure & density decrease where as the velocity increase are known as following regions :

   (a) Expansion
   (b) Compression
   (c) Neutral
   (d) None of these

   Ans: (a)

6. A closed cycle gas turbine works on

(a) Carnot cycle
(b) Rankine cycle
(c) Brayton cycle
(d) Joule cycle

Ans: (c)

7. Diffuser must provide minimum

(a) Pressure loss
(b) Velocity loss
(c) Density loss
(d) None of these

Ans: (a)

8. Best suited Gas turbine engine for aircraft is

(a) Constant Pressure
(b) Constant volume
(c) Combination of a & b
(d) None of the above

Ans: (a)

9. Free turbine is used in

(a) Turbo jet and Turboprop
(b) Turbofan and Turboprop
(c) Turboprop and Reciprocating
(d) Turboprop and Turboshaft

Ans: (d)

10. In case of a rocket engine the mixture of fuel and oxidiser is called

(a) Oxygen fuel
(b) Oxidiser
(c) Propellent
(d) ATF

Ans: (c)

11. Turbojet engine produces thrust by

(a) acclerating large mass of gas through small velocities
(b) acclerating small mass of gas through small velocities
(c) acclerating small mass of gas through large velocities
(d) none of the above

Ans: (c)

12. Aircraft thrust is generated based on principle of

(a) Newtons first law
(b) Charles Law
(c) Newtons Third law
(d) None of the above.

Ans: (c)

13. The combustion is initiated in a gas turbine engine by

(a) Igniter Plug
(b) Spark Plug
(c) Torch Igniters
(d) both (a) and (c)

Ans: (d)

14. The maximum temperature in combustion chamber of a typical aircraft engine is
(a) 850 deg to 1700 deg C
(b) 100 deg to 200 deg C
(c) 300 deg to 500 deg K
(d) None of these.

Ans: (a)

15. In a gas turbine, the combustion of fuel and air is carried out in

(a) Combustion chamber
(b) Compressor
(c) Turbine
(d) None of these.

Ans: (a)

16. In centrifugal flow compressor inlet flow is taking place in

(a) Axial direction
(b) Radial direction
(c) None of these
(d) Both (a) and (b)

Ans: (b)

17. The combination of rotors and stators is found in

(a) Axial flow compressors
(b) Centrifugal flow compressors
(c) Reciprocating compressors
(d) None of these

Ans: (a)

18. Which of the following forces are called axial forces?

(a) Shear and compression
(b) Torsion and shear
(c) Tension and shear
(d) Tension and compression

Ans: (d)

19. The free turbine configuration is used in

(a) Turbo prop and turbo shaft
(b) Turbo jet
(c) Pulse jet
(d) Ram jet

Ans: (d)

20. Stress is a

(a) Vector
(b) Scalar
(c) Tensor
(d) Special scalar

Ans: (c)

21. The mechanism used in petrol engine is

(a) Crank mechanism
(b) Slider mechanism
(c) Slider crank mechanism
(d) Natural lines and circular

Ans: (c)

22. Reynolds No. may be defined as the ratio of

(a) Inertial forces to Viscous forces
(b) Elastic forces to pressure forces
(c) Viscous forces to gravity forces
(d) None of the above

Ans: (a)

23. Aerofoil shape is imparted to the aircraft wing by structures known as

(a) Longerons
(b) Stringers
(c) Ribs
(d) Spars

Ans: (d)

24. In multistage turbines by introducing reheating
(a) Thermal efficiency improves
(b) The output of turbine increases
(c) Work done by compressor reduces
(d) The ratio compressor work/turbine decreases

Ans: (a)

25. In Jet engine the compression ratio

(a) Varies with altitude
(b) Varies with square of speed
(c) Varies as cube of speed
(d) remains constant

Ans: (b)

26. Gas turbine used in aircraft is of

(a) Open cycle type
(b) Closed cycle type with reheating
(c) Closed cycle type with reheating and regeneration
(d) Open cycle type with reheating, regeneration and intercooling

Ans: (a)

27. Stress concentration occurs when

(a) A body is subjected to excessive stress
(b) A body is subjected to unidirectional stress
(c) A body is subjected to fluctuating stress
(d) A body is subjected to non uniform stress distribution

Ans: (d)

28. The inability of a body to change its state of rest or uniform motion along a straight line is called its

(a) Momentum
(b) Velocity
(c) Acceleration
(d) Inertia

Ans: (d)

29. A material subjected to reversal of stresses does not fail at a stress known as

(a) fatigue stress
(b) Proof stress
(c) Safe stress
(d) Endurance stress

Ans: (d)

30. In simple harmonic motion the acceleration is proportional to

(a) Displacement
(b) Linear velocity
(c) Angular velocity
(d) Rate of change of angular velocity

Ans: (a)

31. The relation Stress/Strain is called as

(a) Youngs modulus
(b) Rigidity modulus
(c) Shear modulus
(d) Poisson's ratio

Ans: (a)

32. Resistance offered by a body against external distorting force is called

(a) strain
(b) stress
(c) shear strain
(d) modulas

Ans: (a)

33. Inviscid and incompressible flow means

(a) Viscosity and pressure are constant
(b) Viscosity is zero and density is constant
(c) Viscosity is constant and density is zero
(d) None of the above

Ans: (b)

34. In a structure bending moment is maximum when

(a) Shear force is maximum
(b) Shear force is zero
(c) Axial force is zero
(d) Axial force is maximum

Ans: (b)

35. LP and HP compressors are coupled

(a) Rigidly by shaft
(b) Thermodynamically
(c) Aerodynamically
(d) None of the above

Ans: (b)