

m/s. Nozzle angle is 20° and mean blade velocity is 400 m/s. The blades are equiangular. The mass flow rate is 1000 kg/min and friction factor is 0.8. Determine: (i) Blade angles, (ii) Axial thrust (iii) Power, (iv) Blade efficiency, (v) Stage efficiency if nozzle efficiency is 93%.

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What are the essentials of a good boiler? Distinguish between Fire tube & Water tube boilers. Give two names of each. Give a neat-labeled sketch of a Babcox and wilcox Boiler.
- (b) Condenser vacuum of a surface condenser is 70 cm of Hg. barometric reading is 76.5 cm of Hg. Mean condenser temperature = 35°C . hot well temperature = 28°C , condensate collected = 1800 kg/hr. cooling water inlet temperature = 12°C . cooling water outlet temperature = 27°C . Calculate: (i) vacuum efficiency, (ii) condenser efficiency.

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) A gas turbine plants consists of two stage compressor with perfect intercooler and a single stage turbine. If the plants work between the temperatures limits 300 K and 1000 K and 1 bar and 16 bar. Find the net power of the plant per kg of air. Take specific heat at constant pressure 1 kJ/kgK.
- (b) What is the principle of jet propulsion? Classify the jet propulsion engines. Explain the working of turbo jet engines by making neat sketch.

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B. TECH
(SEM. IV) THEORY EXAMINATION 2017-18
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Time: 3 Hours

Total Marks: 100

- Note: 1. Attempt all Sections.
2. Assume any missing data.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20
- Determine the dimensions of force, work, energy and power.
 - Define accuracy and precision with suitable example.
 - What is the principle of ramp type digital voltmeter?
 - Explain rise time and fall time with neat diagram.
 - Name the bridge circuits used for the measurement of self inductance.
 - What are the criteria for balance of a Wheatstone bridge?
 - Why triggering is needed in CRO?
 - List the main parts of CRT.
 - What are the advantages of digital instruments over analog instruments?
 - What are the different calibration methodologies?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30
- Explain different types of errors that may occur in measurements. Differentiate between gross errors and systematic errors. List a few ways of minimizing the effect of errors in measurement.
 - Explain multimeter probes. What are the two methods of measuring current using high current probes of multimeter?
 - Define the Q-factor of a coil. Explain with a circuit diagram the construction and principle of operation of a basic Q-meter?
 - Draw the basic block diagram of an oscilloscope and state the function of each block.
 - On what factors does the frequency of instrumentation calibration depend? Explain how A.C. voltmeter calibration can be done.

SECTION C

3. Attempt any one parts of the following: 10 x 1 = 10
- Describe the principle of operation, advantages, disadvantages and application of PMMC.
 - Describe the principle of operation and use of Galvanometer in detail with suitable diagram.
4. Attempt any one parts of the following: 10 x 1 = 10
- Draw and explain the block diagram of the Ramp Type DVM with its system waveform. Compare digital and analog Multimeter.
 - Draw and explain the block diagram of a digital frequency meter system in detail.

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10 x 1 = 10

5. Attempt any one parts of the following:

- a) State various methods of measurement of low resistance. Why ammeter-voltmeter methods not suitable for the precise measurement of low resistance?
- b) Derive an expression for finding unknown resistance and Inductance for Maxwell Bridge.

10 x 1 = 10

6. Attempt any one parts of the following:

- a) Describe with block diagram the operation of a digital storage CRO (DSO). State the function of each block. Also write its applications.
- b) Explain CRO probe and Sampling Oscilloscope in detail with suitable diagram.

7. Attempt any one parts of the following:

10 x 1 = 10

- a) Describe with the help of a block diagram the operation of a X-Y recorder. Also list the application of X-Y recorder.
- b) Draw and explain the circuits for calibration of d.c. voltmeter and wattmeter with standard instruments.

B.TECH
(SEMESTER IV) THEORY EXAMINATION 2017-18
DATA STRUCTURE & ALGORITHMS

Time: 3 Hours

Total Marks: 70

- Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14
- a. What do you mean by Abstract Data Type of a data structure?
 - b. Differentiate internal sorting and external sorting also enlists the name of two sorting techniques of each.
 - c. Write a C program to multiply two integer number using recursion
 - d. What do you mean by priority queue?
 - e. Define Threaded binary tree with advantage over binary tree.
 - f. Explain Transitive Closure.
 - g. Write the function to insert an element in circular queue.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21
- a. Consider the two dimensional lower triangular matrix (LTM) of order N. Obtain the formula for address calculation in the address of row major and column major order for location LTM[i][k]. If base address is BA and space occupied by each element is w byte.
 - b. In the Towers of Hanoi puzzle, we are given a platform with three tower, a, b, and c, sticking out of it. On tower a is a stack of n disks, each larger than the next, so that the smallest is on the top and the largest is on the bottom. The puzzle is to move all the disks from tower a to tower c, moving one disk at a time, so that we never place a larger disk on top of a smaller one.
 - (i) Describe a recursive algorithm for solving the Towers of Hanoi puzzle for arbitrary n disk
 - (ii) How many function calls are there for n disks?
 - c. Define stack with suitable example. Write a program to reverse a string using Stack. Choose a C data structure for such a stack and design push and pop functions for it.
 - d. Translate the infix string $(a - b^c^d) * (e + f/d)$ to reverse polish notation using stack.
 - e. Explain any three commonly used hash function with the suitable example. A hash function H defined as $H(\text{key}) = \text{key} \% 7$, with linear probing is used to insert the key 37, 38, 72, 48, 98, 11, 56 into a table indexed from 0 to 6.

what will be the location of key 11. Justify your answer. also count the total number of collision in this probing.

SECTION C

7 x 1 = 7

3. Attempt any one part of the following:

- a. What are the advantages of linked list over arrays? Implement Doubly Circular linked list and insert an element at given position in this linked list.
- b. Assume that the operators +, -, × are left associative and ^ is right associative. The order of precedence (from highest to lowest) is ^, ×, +, -. Then find the postfix expression corresponding to the infix Expression $a + b \times c - d \wedge e \wedge f$

7 x 1 = 7

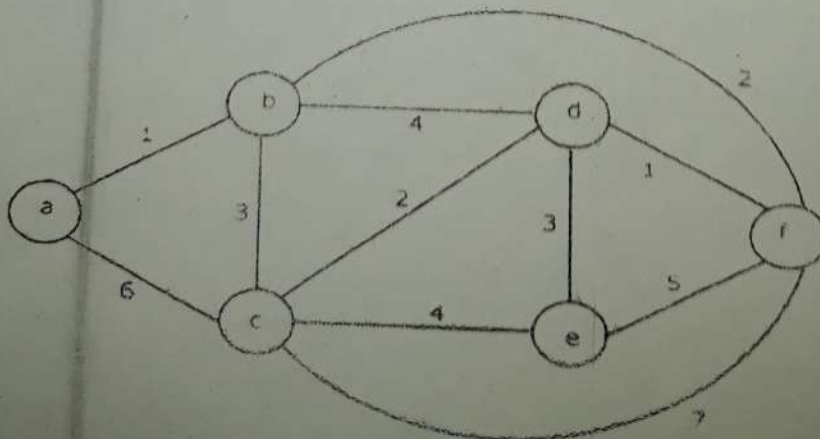
4. Attempt any one part of the following:

- a. Draw the Huffman tree for the following symbols (each of 7 bits) whose frequency of occurrence of a message is stated along with the symbols below
 $M_1: 0.45 \quad M_2: 0.02 \quad M_3: 0.24 \quad M_4: 0.18 \quad M_5: 0.11$
 decode the following message
 1011001101111110011001011111101101100.
 and what is the average number of bits required per message.
- b. Write algorithm for Floyd warshall algorithm also explains with a suitable example.

7 x 1 = 7

5. Attempt any one part of the following:

- a. Write C function for following in Binary Tree
 (i) Count the number of total nodes.
 (ii) Height of Binary Tree.
- b. Write Prim's algorithms and Find the Minimum Spanning tree for following graph



6. Attempt any *one* part of the following:

7 x 1 = 7

a. Construct a binary tree for the following preorder and inorder traversals. Explain with a neat diagram:

Preorder: ABDIEHJCFKLG

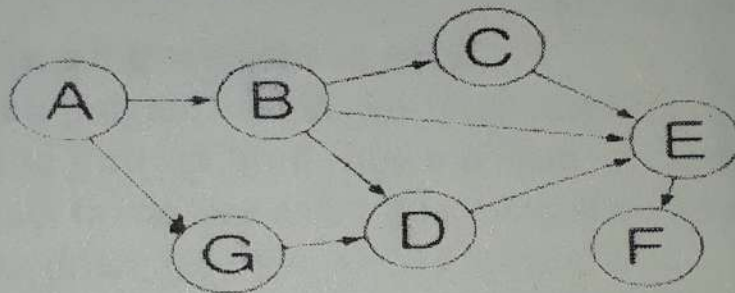
Inorder: DIBHJEAFLKCGM

b. Explain Binary Search algorithm and its time complexity? Implement the binary search in C language.

7. Attempt any *one* part of the following:

7 x 1 = 7

a. Discuss what type of data structure is used in DFS. Write an algorithm for DFS. Traverse the given graph starting from node A using DFS



b. Construct an expression tree for the expression $(-b + \sqrt{b^2 - 4ac}) / 2a$. Give pre-order, in-order and post-order traversals of the expression tree so formed

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B. TECH
(SEM IV) THEORY EXAMINATION 2017-18
MICROPROCESSOR AND MICRO-CONTROLLER

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt all questions in brief.** **2 x 7 = 14**
- a. Write a program to add two 16-bit numbers in 8085.
 - b. Define Pull-up /Pull -down resistor concept in MSP430 Micro -controller
 - c. Explain Immediate and Indirect Register addressing modes in 8085 microprocessor.
 - d. Write down any four GPIO registers
 - e. Draw and Explain Flag Register model in 8085 microprocessor.
 - f. Define functionality of WDTNMI and WDTNMI
 - g. Write a program to find 2's compliment of a 16-bit number in 8085.

SECTION B

2. **Attempt any three of the following:** **7 x 3 = 21**
- a. Draw and explain the PIN Diagram of 8085 microprocessor.
 - b. How WDT (Watch Dog Timer) works in MSP430? Explain.
 - c. Explain SIM and RIM instructions with their control word format.
 - d. Explain SPI protocol and communication interface with MSP430.
 - e. Explain 8279 Keyboard and its interfacing with 8085 microprocessors.

SECTION C

3. **Attempt any one part of the following:** **7 x 1 = 7**
- a. Write a Program in 8085 to sort a series of numbers in Ascending Order.
 - b. Explain the Architecture of 8085 microprocessor.
4. **Attempt any one part of the following:** **7 x 1 = 7**
- a. Interface 8085 microprocessor with 4Kb EPROM and 2Kb RAM using 3*8 decoder. Also write down the range of addresses for both EPROM and RAM.
 - b. Interface 8255 PPI (Programmable Peripheral Interface) with 8085 microprocessor.
5. **Attempt any one part of the following:** **7 x 1 = 7**
- a. Draw and explain functional block diagram of MSP430x5x series
 - b. Explain various addressing modes with example of each of MSP 430 series.
6. **Attempt any one part of the following:** **7 x 1 = 7**
- a. Explain the working of PWM (Pulse width modulation) with its block diagram.
 - b. What are the various GPIO resistors in MSP430x5xx? Explain each resistor in brief.
7. **Attempt any one part of the following:** **7 x 1 = 7**
- a. What are the different transfer mode in the DMA? Explain in brief
 - b. Explain the Data frame format in I2C communication

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**B. TECH
(SEM-IV) THEORY EXAMINATION 2017-18
ELECTROMAGNETIC FIELD THEORY**

Time: 3 Hours

Max. Marks: 70

Note: Be precise in your answer. In case of numerical problem assume data wherever not provided

SECTION – A

1. Attempt all parts of the following questions:

2×7=14

- (a) Write the Poisson's and Laplace equation.
- (b) State point form of ohms law & Gauss's law.
- (c) Explain Biot-Savart's Law.
- (d) Give Maxwell's equations in differential and integral form.
- (e) Give applications of Smith chart.
- (f) Transform the point P(5,3,6) in cylindrical coordinate system.
- (g) Explain Faraday's law.

SECTION B

2. Attempt any three parts of the following questions:

3×7=21

- (a) Calculate the capacitance formed by two back to back cones separated by infinitely small distance.
- (b) State and derive ampere circuital law. A single turn circle coil of 50 meters in diameter carries current 28×10^4 Amp. Determine the magnetic field intensity H at a point on the axis of coil and 100 meters from the coil. The relative permeability of free space surrounding the coil is unity.
- (c) Prove that magneto static energy is given by

$$W_m = \frac{1}{2} \int_V \epsilon H^2 dv.$$

- (d) Determine the magnetic flux density B at a distance d meter from an infinite straight wire carrying current I. Also find out when the length of the wire is semi-infinite.

- (e) A uniform plane wave propagating in good conductor. If the magnetic field intensity is given by $H = 0.1e^{-15} \cos(2\pi \times 10^8 t - 15z) i$ A/m, determine the conductivity and corresponding component of E field. Also calculate the average power loss in a block of unit area and thickness t .

SECTION C

3. Attempt any One part of the following questions: 7×1=7
- (a) State and explain Maxwell's equations for time varying fields in differential and integral forms and their significance.
- (b) (i) Find the divergence of a vector $A = 8x^2 i_x + 5x^2 y^2 i_y + xyz^3 i_z$ and $\text{del } \nabla$ of a scalar function $x^2 yz$.
- (ii) Describe the gradient of a scalar field.
4. Attempt any One part of the following questions: 7×1=7
- (a) Point charges $Q_1 = 1nC$, $Q_2 = -2nC$, $Q_3 = 3nC$ and $Q_4 = -4nC$ are positioned one at a time in that order at $(0,0,0)$, $(1,0,0)$, $(0,0,-1)$ and $(0,0,1)$ respectively. Calculate the energy in the system after each charge is positioned.
- (b) Explain Skin effect. Derive the expression for α and β in a conducting medium.
5. Attempt any One part of the following questions: 7×1=7
- (a) Define propagation constant and characteristic impedance. Derive the boundary conditions for electric field between two dielectrics having different permittivity interfaces.
- (b) State Poynting theorem. Derive the mathematical expression for Poynting theorem.
6. Attempt any One part of the following questions: 7×1=7
- (a) A transmission line operating at 500 MHz has $z_0 = 80 \Omega$, $\alpha = 0.04 \text{ NP/m}$, $\beta = 1.5 \text{ rad/m}$. Find the line parameters R, L, G, C.
- (b) Explain the phenomena of polarization and its types.
7. Attempt any One part of the following questions: 7×1=7
- (a) Find the potential function and electric field intensity for the region between two concentric right circular cylinders where $V=V_0$ at $r=a$ and $V=0$ at $r=b$ ($b>a$)?
- (b) Explain the reflection of plane wave for normal indices. Discuss about Reflection and transmission coefficient for F and H.

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BTECH
(SEM-IV) THEORY EXAMINATION 2017-18
POWER PLANT ENGINEERING

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt all questions in brief.** **2 x 7 = 14**
- Explain the precipitation, run-off, evaporation and hydrograph of hydro-electric station.
 - Explain the flow duration curve and mass curve of hydro-electric station.
 - Explain the selection of site for a thermal station.
 - Explain the fuel handling for a thermal station.
 - Explain the nuclear shell model and mass energy equivalence for a nuclear power station.
 - Explain the radio-activity and radio-active change for a nuclear power station.
 - Define Economic load sharing.

SECTION B

2. **Attempt any three of the following:** **7 x 3 = 21**
- Explain with suitable figures classification of hydro-electric plants.
 - Explain the main parts and working of thermal station with schematic layout.
 - Explain the nuclear materials and feasibility of a nuclear power station.
 - Explain in detail the MHD power generation.
 - Explain the power factor tariffs, maximum demand tariffs, block rate tariffs and two part tariffs.

SECTION C

3. **Attempt any one part of the following:** **7 x 1 = 7**
- Discuss the general arrangements and operation of a hydro-electric plant.
 - Explain the governing of turbines, draft tube, cavitation and hydro-electric generator.
4. **Attempt any one part of the following:** **7 x 1 = 7**
- Explain in detail about fuels in thermal stations. Define combustion and combustion equipment.
 - Explain ash disposal and dust collection. Define draught systems. Write a note on feed water in thermal stations.

5. Attempt any *one* part of the following:

7 x 1 = 7

- a) Discuss the nuclear reactions. Explain the main parts of a reactor and their functions of nuclear power station.
- b) Explain with suitable diagrams boiling water reactor and pressurized water reactor.

6. Attempt any *one* part of the following:

7 x 1 = 7

- a) Explain the solar power generation in detail.
- b) Explain the wind power generation in detail.

7. Attempt any *one* part of the following:

7 x 1 = 7

- a) Explain the real and reactive power exchange among interconnected systems.
- b) Explain the performance and operating characteristics of power plants.

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BTECH
(SEM-IV) THEORY EXAMINATION 2017-18
ELECTRICAL MACHINES-I

Time: 3 Hours

Total Marks: 70

- Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

- a) Explain with the help of an example why in an electrical machine the number of stator poles should be equal to the number of rotor poles.
- b) Explain Faraday's laws of electromagnetic induction and Lenz's law.
- c) Explain why equalizer connections are used in lap-winding and dummy coils are sometimes used in wave-windings.
- d) Explain why a DC motor should not be started direct-on-line.
- e) Describe how a DC machine is to be maintained for a long satisfactory performance.
- f) Explain the function of a commutator in a DC machine for motoring and generating action.
- g) State why the core of a transformer should be made of magnetic material.

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

- a) The magnetic flux density on the surface of an iron face is 1.6 T which is a typical saturation level value for ferromagnetic material. Find the force density on the iron face.
- b) Derive the EMF equation and torque equation for DC machines.
- c) A 250 kW, 400 V, 6-pole DC generator has 720 lap wound conductors. It is given a brush lead of 2.5 angular degrees (mech.) from the geometric neutral. Calculate the cross and demagnetizing turns per pole. Neglect the shunt field current.
- d) A transformer on no-load has a core loss of 50 W, draws a current of 2 A (rms) and has an induced emf of 230 V (rms). Determine the no-load power factor, core-loss current and magnetizing current. Also calculate the no-load circuit parameters of the transformer. Neglect winding resistance and leakage flux.
- e) A 20 kVA, 50 Hz, 2000/200 V distribution transformer has a leakage impedance of $0.42 + j0.52 \Omega$ in the HV winding and $0.004 + j0.05 \Omega$ in the LV winding. When seen from the LV side, the shunt branch admittance Y_0 is $(0.002 - j0.015) \text{ S}$ (at rated voltage and frequency). Draw the equivalent circuit referred to (i) HV side (ii) LV side, indicating all impedances on the circuit.

SECTION C

3. Attempt any one part of the following:

7 x 1 = 7

- a) Find an expression for the force per unit area between the plates of a parallel plate condenser in terms of the electric field intensity. Use both the energy and coenergy