BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI/FT**

Subject: **Basic Electrical Engineering (CC304)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) List the type of losses in transformer and explain any one.
b) Why starters are necessary for starting of DC motors?
c) Define Average value, Peak factor and Form factor of sinusoidal AC waveform.
d) Explain with neat diagram the method of reversal of direction of rotation of three phase induction motor.
e) Explain the necessity of earthing.
f) Explain with neat diagram the basic construction of a shell type transformer.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain with neat diagrams the concept of phase sequence in a three phase electrical system.
b) With a neat diagram, explain star connected three phase system. Write relationships between line and phase voltages and currents for star connected system. State one advantage of star connected system.
c) Draw power triangle and define apparent reactive power and real power. Why is it said that reactive power does houseful work in the circuit?

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain voltage regulation and efficiency of a transformer.
b) Explain with neat diagram the working principle of transformer.
c) A 50KVA, 6600/250V transformer has 52 secondary turns. Find: i) The number of primary turns ii)Full load primary and secondary current
Neglect losses.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) List the various methods of speed control of DC shunt motor and explain any one in detail with a neat diagram.
b) With a neat diagram, explain the working of DC motor.
c) Write a note on 'classification of DC motors'. Draw their connection diagrams.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Give the classification of three phase induction motor and state any two applications of each type. Also draw the torque-slip characteristics of three phase induction motor.
b) With a neat diagram, explain the working of direct on line starter.
c) Explain with a neat diagram working principle of split phase single phase induction motor. Also state its application.

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Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain the methods of reducing earth resistance.

b) With a neat diagram explain HRC fuse.

c) Explain the need of fuse in electrical circuit and define the following terms for fuse: i)Voltage rating ii) Breaking capacity iii) Minimum fusing current

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Basic Electronics Engineering (CC308)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Define following terms: (any 2)
i)Impurity ii) Semiconductor iii) Doping

b) Enlist any two important ratings/specifications of p-n junction diode, with definition.

c) Explain zener breakdown mechanism.

d) What are the terminal names of transistor (BJT)? State the function of each.

e) Define following terms with respect to FET: i) rd ii) gm

f) Compare FET with BJT.(any 3 points)

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Compare intrinsic and extrinsic types of semiconductors. (any 4 points)

b) Explain formation of P-type semiconductor with necessary diagrams.

c) With neat circuit diagram, explain V-I characteristics of p-n junction diode.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) What is a rectifier? With neat circuit diagram, explain half wave rectifier without filter. Draw input output waveforms.

b) What is a filter? Compare 'C' filter with L-C filter. (any 3 points)

c) i)Define the terms depletion region, majority carriers with respect to p-n junction diode.
ii)Why is the transistor known as BJT?

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain zener shunt regulator with constant load and variable power supply.

b) For the zener shunt regulator, calculate output voltage and zener current if Vin=90V, V_z=45V, Rs=1K and R_L=3K. What will be output voltage and load current if R_L is changed to R_L=5K?

c) i)Compare p-n junction diode with zener diode. (any 3 points)
ii)Define α_{dc} and β_{dc} with respect to BJT and also write relationship between them.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Compare CE and CC configurations of BJT. (any 4 points)

b) Draw circuit diagram to study input characteristics of CE configurations. Explain the same with neat input characteristics graph.

c) Explain the transistor as a switch and write its applications as a switch.

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Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw only the structure and symbol of following:
i)P- channel JFET ii) n-channel depletion type MOSFET

b) Explain the working of n-channel enhancement type MOSFET with its structure and symbol.

c) Draw circuit diagram to study drain characteristics of n-channel JFET. Draw drain characteristics and explain.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI/COMP/E/E&EE**

Subject: **Digital Electronics (CC309)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Convert the following: i)$(2F9A)_{16}=(\_\_\_\_\_)_2$ ii)$(25.5)_{10}=(\_\_\_\_\_)_2$ iii)$(101101)_2=(\_\_\_)_{10}$

b) Draw the circuit of Half adder using logic gates and write its truth table.

c) What is a Register? List two applications of register.

d) Draw the symbol and write the truth table of clocked JK Flip Flop.

e) Define: i)PROM ii)EPROM

f) Define Flip Flop. List two applications of Flip Flops.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Write short note on: i)BCD code ii)ASCII code

b) i)Convert the following binary numbers to Gray code :
1)10110 2)101111
ii)Convert the following Gary codes to binary numbers:
1)1001011 2) 110011

c) i) Define analog and digital signals.
ii) Write 2's complement of : 1)$(11011000)_2$
2) $(01100111)_2$

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Implement OR and EXOR gate using NAND gate.

b) i)State duality theorem with an example.
ii) Draw block diagram of BCD to 7 segment decoder driver. (common cathode)

c) What is a demultiplexer? Explain 1 to 4 demultiplexer using logic gates and write its truth table.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the symbol, truth table of JK master slave Flip Flop and explain its operation.

b) Draw the symbol and truth table of clocked: i)D flip flop ii)T flip flop iii)RS flip flop

c) Explain full subtractor circuit using logic gates and write its truth table.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain 4 bit PISO shift register with logic diagram and timing diagram with suitable data.

b) Explain the operation of 4 bit asynchronous down counter with neat diagram.

c) Explain the operation of 4 bit synchronous up counter with neat diagram.

Q.No.6. Write short note on any two: **2 x 6 = 12**

a) ADC

b) PIPO shift register

c) Semiconductor memories RAM and ROM

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Communication Engineering (EX301)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Define Modulation. What is the need for Modulation?
b) Define: i) Noise figure ii) Signal to Noise Ratio
c) Define Frequency Modulation. Draw the waveforms.
d) Draw the block diagram of a high level AM transmitter.
e) Define Virtual Height and Critical Frequency w.r.t. sky wave propagation.
f) Compare NBFM and WBFM.
g) Draw the block diagram of ISB transmitter.
h) What do you understand by sensitivity, selectivity and fidelity w.r.t receiver?

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) With the help of a neat block diagram, explain the communication system.
b) Define Pulse Modulation Techniques. (PAM, PWM, PPM) Give the relevant waveforms.
c) i) What is Amplitude Modulation? What is modulation index for AM?
ii)A 800W carrier is modulated to a depth of 70%. Calculate the total power in this Amplitude Modulated wave.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) With the help of a neat diagram, explain the filter method of suppressing a sideband in Amplitude Modulation.
b) Draw the block diagram of low level AM transmitter. Explain the function of each block.
c) Explain envelope detector circuit with a neat diagram. Draw the relevant waveforms.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) i) Compare AM and FM. (3 points)
ii) Draw the block diagram of FM Receiver.
b) With neat diagram, explain the working of Balanced Slope Detector. Draw the S shaped curve for the same.
c) Explain the working of Varactor diode modulator for generating FM signal.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) i) Define frequency deviation and bandwidth for FM.
ii) Draw the block diagram of FM stereo transmitter.
b) With a neat diagram, explain the working of Superheterodyne receiver.
c) Write a note on Ionosphere and its effects.

Q.No.6. Write short note on any three: **3 x 4 = 12**

a) Yagi Uda antenna
b) External noise
c) Ground propagation
d) Pre Emphasis and De Emphasis
e) Stereophonic FM receiver
f) Single side band transmission

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI/E&EE**

Subject: **Circuits & Networks (CC303)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Define active and passive elements.
b) Find I_1 & I_2 from the fig.1. Use current divider theorem.
c) State superposition theorem.
d) Write the formula for converting star network into delta network.
e) Explain phasor diagram of series RC network.
f) Define characteristics impedance of two part network.
g) What do you mean by constant-K type filter?

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Find the equivalent resistance between A and B from fig.2.
b) From fig.3, find current in each branch by current divider theorem.
c) Find current in each mesh by mesh analysis method from fig.4.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Find current through 3Ω by superposition theorem, from fig.5.
b) From fig.6 find node voltages V_1, V_2 and V_3 by node analysis.
c) From fig.7 find V_{th} and R_{th}.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) From fig.8, find R_L for maximum power transfer. Also find P_{max}.
b) From fig.9, find I in the given circuit.
c) In the series R_C circuit fig.10, find Z, I, phase angle, V_R and V_C.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Referring fig.11, determine the frequency at which series R_{LC} circuit resonates. Also find V_L and I at resonance.
b) With reference to series R_{LC} circuit, write a short note on how impedance Z and current I varies with frequency
c) Draw R_C Integrator and R_C differentiator circuits. Also draw their O/P waveforms if I/P waveform is: i) Sine wave
ii) Square wave

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain in brief symmetrical T & Π networks. How to find short circuit and open circuit impedance of both the networks.
b) What do you mean by filter circuit? What are the different types of it? Draw their frequency responses.
c) From fig.12, in passive HPF, find cut off frequency and its characteristics impedance.

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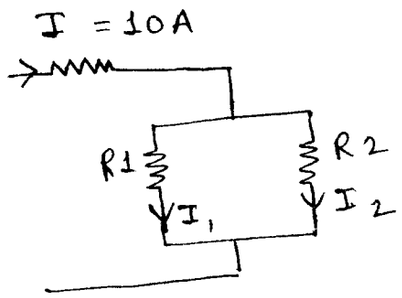

fig (1) Q 1.b

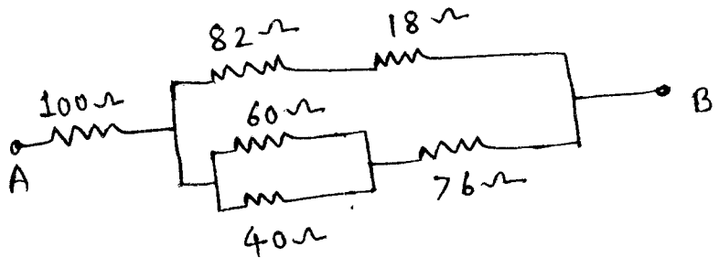

fig (2) Q. 2 a

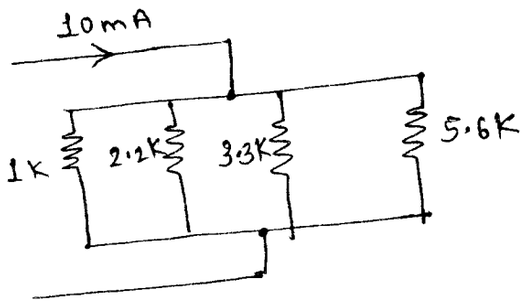

fig (3) Q 2b.

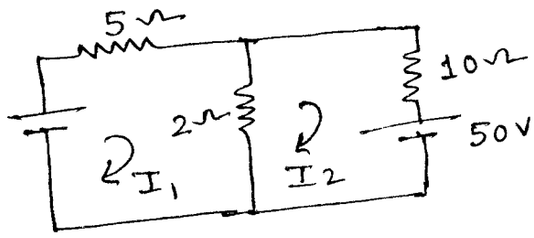

Fig (4) Q. 2 C

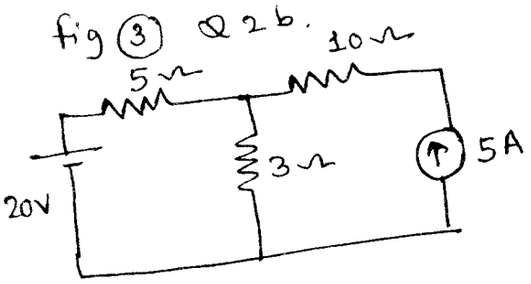

fig (5) Q. 3 a

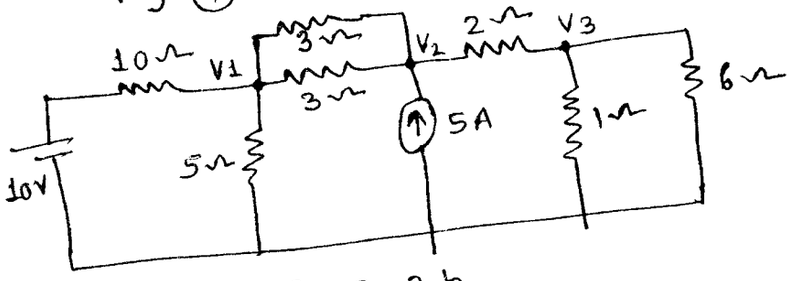

Fig (6) Q. 3 b

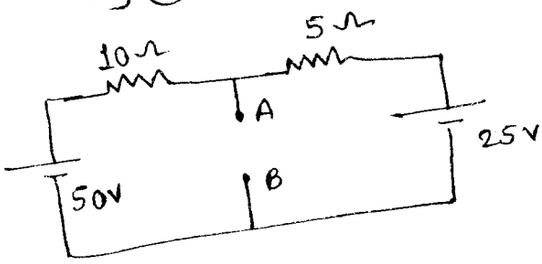

fig (7) Q 3C

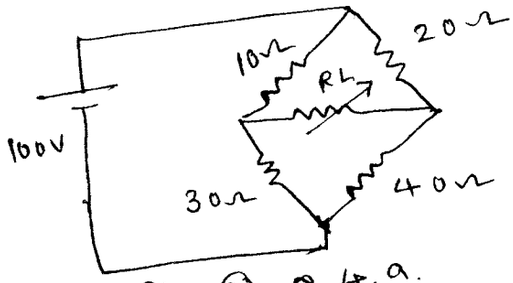

fig (8) Q 4. a.

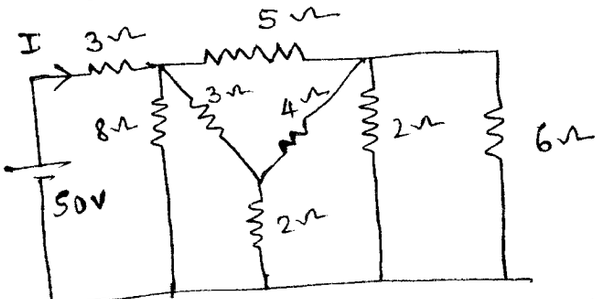

fig (9) Q 4b.

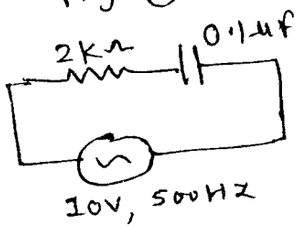

fig (10) Q 4C

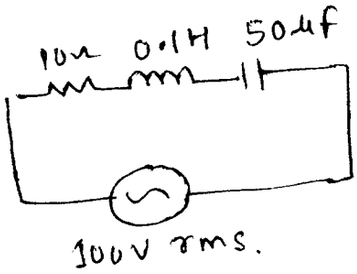

fig (11) Q 5 a.

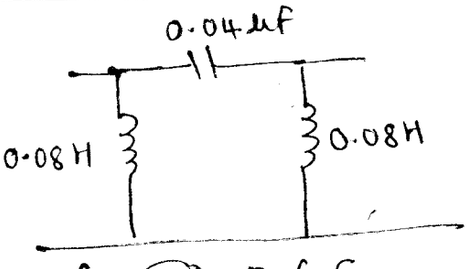

fig (12) Q 6 C.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Electronic Circuits (EX401)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Draw a block diagram of a multistage amplifier. Explain the need for cascading amplifiers.

b) Give one application each of RC coupled, transformer coupled and direct coupled amplifier.

c) List three points of comparison between positive and negative feedback.

d) What is the effect of negative feedback on the voltage gain, input impedance and bandwidth of the amplifier?

e) Explain the need for power amplifiers.

f) List Barkhausen's criteria for sustained oscillations.

g) Explain the function of Schmitt trigger circuit.

h) Explain why the operating point is fixed in the centre of the active region of the characteristic for an amplifier.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the circuit diagram and explain the working of a single stage CE amplifier. Write the biasing technique used in this circuit and list two advantages of this biasing technique.

b) Draw the circuit and explain the working of an RC coupled amplifier.

c) Determine the biasing voltage and current for a voltage divider circuit with V_{CC}=9V B=60, V_{BE}=0.7V, R_C=1.5K, R_E=560Ω, R_1=33K and R_2=4.7K

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the circuit diagram of a fixed bias circuit. Obtain an expression for the Q point. Explain why fixed bias circuit is seldom used.

b) Draw the circuit and explain the working of an emitter follower. List any two applications of the emitter follower.

c) Derive an expression for the voltage gain and output impedance of a voltage series feedback amplifier.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Define the term feedback. List the two types of feedback. Draw a block diagram of a voltage series, voltage shunt, current series and current shunt feedback amplifier.

b) An amplifier with negative feedback has a voltage gain of 100.It is found that without feedback an input signal of 50MV is required to produce a given output. With feedback the input signal must be 0.6V to produce the same output. Calculate A and B.

c) With a neat circuit diagram explain feedback with bypass capacitor in a single stage CE amplifier.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the circuit diagram and explain the working of a class A push pull amplifier.

b) Compare class A, class B and class AB power amplifiers.

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c) Draw the circuit of a Wein Bridge oscillator and explain its working. Write the expression for the frequency of oscillation.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) i) Draw the circuit of a Colpitt's oscillator.

ii) In a Colpitt's oscillator, $C_1=C_2=C$ and $L=100\mu H$. The frequency of oscillation is 500KHz. Calculate C.

b) With a neat diagram explain the operation of an astable multivibrator. Draw the output waveform.

c) Draw the circuit of a monostable multivibrator. Draw the waveform for output and the voltage across the capacitor. Find the width of the output pulse for $R=100K\Omega$ and $C=10\mu F$

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Process Instrumentation (EX408)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Define Primary and Secondary elements with respect to differential head meters. Give an example of each.
b) Draw and explain characteristics of RTD.
c) List any three advantages of C-type Bourdon tube.
d) What do you understand by direct methods of level measurement? List a few.
e) Write a short note on HART communication technique.
f) Explain the significance of Reynold's number in flow measurement.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) With a neat diagram, explain the working of Rotameter.
b) With a neat diagram, explain the working of turbine Flow meter.
c) With a neat diagram, explain the working of ultrasonic Flow meter.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) With a neat diagram, explain the working of liquid in glass thermometer.
b) With a neat diagram, explain the working of bimetallic thermometer.
c) With neat diagram, explain the construction and working of thermocouple.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) With a neat diagram, explain construction and working of U-tube manometer.
b) With a neat diagram, explain the working of Mcleod gauge.
c) With a neat sketch, explain the working of pneumatic to current convertor.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) With a neat diagram, explain the working of float type level indicator.
b) With a neat diagram, explain the working of radiation level detector.
c) With a neat diagram, explain any one hydrostatic pressure method used for measurement of level.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) With a neat diagram, explain the working of flapper nozzle system.
b) With a neat diagram, explain the working of an electronic temperature transmitter.
c) With a neat diagram, explain the working of rotating vane type flowmeter.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **8051 Microcontroller (EX403)/(EN501) [Rat/Rev]**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) What are SFRs? Enlist any three of them.
b) What is PSW register? Draw PSW and state application of it.
c) Write instruction to copy data from port P3 to external RAM location 1500H.
d) Explain indirect addressing mode with example.
(only for students of Rationalised scheme)
e) What is an embedded system? Give any two examples of embedded systems used in day today life.
f) What is ISR? Explain with example.
(only for students of Revised scheme)
e) Write any three points of comparison between microcontroller and microprocessor.
f) Differentiate between 8051 and 8751 microcontroller. (any 3 points)

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw circuit diagram of port 2 and explain Read and Write operation.
b) Explain bit addressable memory structure of 8051.
c) What are different timer modes available in 8051? Explain any one of them.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw and Explain TCON register.
b) How many serial ports are available in 8051? Explain SCON and SBOF registers.
c) Enlist interrupts available in 8051. Write down their priorities and ISR addresses.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain following instructions with example:
i)MOVC A, @ A + DPTR ii)XCHD A, @ R_p
b) Write the contents of accumulator after execution of following instructions:
i)MOV A, # 55 H
RR A
ii)MOV A, # 17 H
DA A
c) Enlist any two 8 bit logical instructions and explain them with example.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Write the assembly language program to perform following:
i)Receive the data from Port 1, invert it and write it to internal register R_5
ii)Exchange the data between two internal RAM locations 44H and 46H
b) What is subroutine? Explain with instructions.

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c) Write a program to increment the data stored at locations of internal RAM from 30H to 35H, by one and store it, back to same location. (use looping method)

(only for students of Rationalised scheme)

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the diagram to interface 7-segment display to any suitable port. Write a program to display only odd numbers continuously.

b) Draw only interfacing diagram:
i)LCD display ii)4 x 4 matrix Keyboard

c) i)Write any two, bit level logical instructions with examples.
ii)Draw only interfacing diagram of stepper.

(only for students of Revised scheme)

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) How many modes are available for transmission of serial data in 8051? Explain any one of them.

b) i)Explain functions of the pins ALE and RESET
ii)Explain rotate instructions.

c) i)Explain SWAP instruction with example.
ii)Explain JUMP instruction with example.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Linear Integrated Circuits (EX405)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Draw the symbol and equivalent circuit of an opamp.

b) Draw the block diagram for:
i)Voltage series feedback amplifier ii)Voltage shunt feedback amplifier

c) Draw the circuit of current to voltage converter. Write the expression for the output voltage.

d) Draw the frequency response for: i)Low pass filter ii)High pass filter

e) List three applications of VCO.

f) Draw a circuit of a non-inverting voltage comparator with positive reference.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the block diagram of an opamp. Explain the function of each block

b) Describe the different types of IC packages.

c) Draw the circuit for a voltage shunt feedback amplifier and explain. Write the expression for voltage gain.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the circuit for each and illustrate how an opamp can be used as: i)Subtractor ii)Adder

b) Draw and explain the circuit of a positive clipper with negative reference. Draw the input and output waveforms.

c) Draw and explain the circuit of a non-inverting clamper with positive reference. Draw the input and output waveforms.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the circuit diagram of first order low pass Butterworth filter. Explain the operation of this filter using the gain magnitude equation.

b) Draw and explain the circuit of a triangular wave generator using opamp.

c) Draw the circuit of a Wein Bridge oscillator using opamp and explain. Write the expression for the frequency of oscillation.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw and explain the circuit of an astable multivibrator using IC 555. Draw waveforms for the capacitor voltage and output voltage.

b) Draw and explain the block diagram of VCO IC 566.

c) List the salient features of 78XX series and 79XX series fixed voltage regulators.

Q.No.6. Answer any two of the following Questions:

a) Draw the circuit of a differentiator using opamp. Write the expressing for the output voltage. Draw the output waveforms for: i)Sinewave input ii)Square wave input

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b) Draw and explain the block diagram of IC 555.

c) Define the following opamp parameters:
i)Input offset voltage ii)Input bias current ii)Output impedance iv)CMRR v)Slew rate vi)Output offset voltage

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Electronic Measurements & Instrumentation (EX406)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Define dynamic characteristics of measuring instruments.
b) Draw block diagram of basic spectrum analyzer.
c) Draw DC wheatstone bridge and write condition for bridge balance.
d) What is transducer? What are analog and digital transducers? Give examples.
e) Explain angular displacement measurement using capacitive transducer.
f) Compare photo diode and photo transistor.
g) Draw block diagram of DC signal conditioning system.
h) Compare LED and LCD.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain analog multimeter in detail with neat diagram.
b) Explain in detail various types of errors which occur in measurement.
c) Explain with neat diagram construction and working of PMMC instrument.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain digital storage oscilloscope with neat block diagram.
b) Explain function generator with neat block diagram.
c) Explain an AC bridge for measurement of unknown capacitance and derive the expression to find the unknown capacitance.
d) A Maxwell bridge is used to measure inductive impedance. The bridge constant at balance are: C_1=0.01μF, R1=470KΩ, R_2=5.1KΩ, R_3=100KΩ. Find the series equivalent of the unknown impedance.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain how linear displacement can be measured using inductive transducer.
b) Write short note on: i)RTD ii) Semiconductor strain gauge
c) Explain in brief following: i)Shaft encoder ii) Piezo electric transducer

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain how flow of any liquid can be measured.
b) Explain a resistive method to measure level of water in tank.
c) Explain any one method in detail to measure angular speed.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain in detail with neat diagram SCADA.
b) Explain process control in detail with neat diagram.
c) Explain data acquisition system with neat block diagram.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics Engg./EC/EI**

Subject: **Programmable Logic Controller (EX501)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) What are the different types of PLC? Explain any one type.
b) List any three important features of a PLC.
c) Sketch and explain the sinking PLC output module.
d) Explain the mathematical instruction "SUBTRACT" with the help of an example.
e) List any four basic ladder programming rules.
f) Explain the data movement instruction "MOV" with the help of an example.
g) Draw and explain the ladder program to represent 'OR' logic function.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw internal architecture of PLC (block diagram) and explain different sections of memory.
b) With the help of a block diagram explain the working of analog input module of a PLC.
c) Draw transistor output unit of a PLC and explain it in details.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) What are the conventions adopted in drawing a ladder diagram?
b) Draw and explain shift left instruction with the help of example to shift 1-bit at a time.
c) Explain any three mathematical instructions with the help of examples.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain all parameters of a PLC counter.
b) Draw functional block of ON-Delay timer and explain its working.
c) Differentiate between Retentive and Non-Retentive timer. Explain working of pulse timer.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw and explain the ladder diagrams of the following logic functions: i)AND ii) NOR iii) XOR
b) Draw ladder diagram for the following boolean expressions:

i) $Y_1 = x_1 \bar{x}_2 + \bar{x}_1 x_2 \bar{x}_3 + x_1 \bar{x}_3$

ii) $Y_2 = \left(x_1 + \bar{x}_2 + x_3\right) \bullet \left(\bar{x}_1 + \bar{x}_2\right) \bullet \left(x_1 + \bar{x}_3\right)$

c) Draw ladder diagram for the following:
Start switch turns ON conveyer belt carrying bottles. A red lamp turns ON after 12 bottles have crossed the sensor on a conveyor belt. Otherwise green lamp is ON. Stop button stops the conveyer belt motor.

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Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain the concept of timing check in fault detection.

b) Describe in brief overview of system documentation.

c) Explain the steps involved in commissioning of a PLC system.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Common**

Subject: **Industrial Organisation & Management (CC601)/(CS601) [Rat/Rev]**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Write down any three points of difference between a joint stock company and a partnership organisation.

b) Explain briefly the packing and forwarding function in the industry.

c) Explain briefly any two internal sources of finance.

d) Explain briefly what is 'arbitration'?

e) Write down any six objectives of an incentive scheme.

f) Explain the following terms in network analysis: i) Critical path ii) Slack

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain 'function organisation' with the help of a neat sketch.

b) Write a note on 'Co-operative societies'.

c) Explain the special features of scientific management.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain briefly the following function of management: i)Controlling ii)Forecasting

b) Explain briefly the following functions in the industry i) Storekeeping (ii) Research and development

c) Explain 'ABC analysis' with the help of a neat sketch.

Q.No.4. Answer any two of the following Questions:

a) i)Write any four objectives of material management. **(02)**
ii)Explain briefly the following terms: i)Reorder point **(04)**
ii)Reserve stock

b) Write a note on 'GST'. **(only for students of Rationalised scheme)** **(06)**

c) What do you understand by a 'financial statement'? Write a short note on 'balance sheet'. **(only for students of Revised scheme)** **(06)**

d) A machine was purchased for Rs.60,000 and its useful life is estimated to be 10 years. Its scrap value at the end of 10 years is estimated to be Rs.12,000 using the diminishing balance method, calculate the depreciation fund at the end of one year. **(06)**

Q.No.5. Answer any two of the following Questions:

a) i)What do you understand by the term 'Industry Relations'? **(02)**
ii)Explain briefly the role of trade unions in industrial relations. **(04)**

b) Write a note on 'group incentive plan'? **(06)**

c) Write a note on 'Promotion and transfer'. **(06)**

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Write a short note on the Workmen's Compensation Act 1923.

b) Write down any six points of difference between CPM and PERT.

c) The activities of a project and the duration in weeks are given below. Draw the network diagram, determine the critical path and the project duration:

Activity	Duration (in weeks)
1-2	4
2-3	7
2-4	4
3-5	5
4-5	4
5-6	3

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Electro Pneumatics Control Circuits (EX632)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) State the disadvantages of pneumatic systems.
b) Draw the symbols of 2/2 dc valve, 3/2 dc valve and check valve.
c) Draw the pneumatic circuit using meter in.
d) Draw the symbol and circuit diagrams for OFF Delay Timer.
e) A double acting cylinder is to extend on pressing a push button switch and retract after a time delay. Draw an 8051 microcontroller circuit to control the cylinder.
f) Write an 8051 assembly program to control the cylinder in Q1e.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain the working of any one type of rotary compressor with the help of neat diagram.
b) Draw the block diagram showing general layout of a pneumatic system and explain.
c) Explain the working of pressure regulator valve and pressure relief valve. Also draw their symbols.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the symbol of a one way flow control valve and explain the working.
b) Describe the various types of actuators and direction control valves with the help of symbols.
c) Draw the pneumatic circuit used for semi automatic control of a double acting cylinder and explain the working.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) With the help of a pneumatic circuit, explain any one application of a sequence valve.
b) Draw the pneumatic circuit used for fully manual control of a double acting cylinder and explain the working.
c) Draw the timing diagram, symbol and circuit diagram of an OFF delay timer. Explain its working.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) With the help of diagram, explain the working of an inductive sensor.
b) With the help of a diagram, explain the working of a Relay.
c) When a push button is pressed, a double acting cylinder extends to open a valve in a pipeline. When the push button is released the valve is closed. Draw an 8051 microcontroller circuit to control the cylinder and write an 8051 assembly program to implement the control.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) A cylinder is to extend if a metallic object is detected and I it is to retract when reset switch is pressed. Draw an 8051 microcontroller circuit to control the cylinder and write an 8051 assembly program to implement the control.

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b) A double acting cylinder it to extend when sensor 1 and sensor 2 are activated. The cylinder is to retract automatically when sensor 3 detects the fully extended position. Draw an 8051 microcontroller circuit to control the cylinder and write an 8051 assembly program to implement the control.

c) Draw an 8051 microcontroller control circuit for fully manual control of double acting cylinder. Write an 8051 assembly program for the said circuit.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Industrial Communication (EX637)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Differentiate with three points, between packet switching and circuit switching.
b) Describe the functions of bridges and routers.
c) Write three points to describe OLE for process control.
d) List six specifications of profibus standard.
e) Describe three advantages of ISA 100 wireless protocol
f) Describe the bus and star network topologies.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain how the TCP/IP model works.
b) Describe the functions of the network and transport layers of the ISO OSI model.
c) Explain the CSMA/CD technique.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) List four differences between ARCNET and ETHERNET.
b) Describe six features of the RS232 standard.
c) Describe features of the DeviceNet protocol.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Describe the fieldbus architecture.
b) Write three functions each, of the HART universal commands and device-specific commands.
c) Describe six applications of the HART protocol.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw and describe the modbus protocol structure of the modbus message frame.
b) Write three solutions each to no-response errors and CRC errors in modbus.
c) Describe the communication objects of the profibus communication standard.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) With the help of a diagram, write a note on radio modems.
b) Describe wireless HART technology.
c) List six features of 100 Mbps industrial ethernet.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Comp. Control in Process Plant (EX605)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Explain centralized computer control scheme.
b) Explain function if signal convertor with example.
c) Explain the term proportional offset with reference to proportional control.
d) Compare SCADA and DCS.
e) Explain the terms process load and control lag.
f) Describe trends in SCADA.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain how DC motor is used as an actuator.
b) Explain the working of a hydraulic actuator.
c) Give any practical example of actuator and control valve used in a process control loop and explain the working.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) What do you understand by discontinuous controller modes? Explain any one in detail.
b) What are composite controller modes? List them and explain any one in detail.
c) Explain the working of cascade control.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain the role of Manager and Supervisor in DCS.
b) Explain the working of an adaptive controller.
c) Explain the working of an intelligent controller.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Describe the various communication modules used in SCADA.
b) With the help of a diagram explain daisy chair configuration in SCADA.
c) Explain the polling and interrupt techniques for channel scanning in SCADA.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) List the components of DCS and explain the functions of each component.
b) Explain an application of DCS with the help of a block diagram.
c) Describe the role of a plant operator in DCS.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Building Automation (EX635)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) State the advantages of BMS system.
b) List the various sensors used in AHU.
c) Explain the daylight harvesting control strategy.
d) Explain the application of BMS in hospitals.
e) Draw a diagram of a 4 pipe system used in HVAC.
f) Explain the loads acting on an HVAC system.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Describe the components of BMS system.
b) Explain the function of zone level, system level and operator level controller.
c) Describe communication trunks using twisted copper wire and fiber optic cable.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain the terms Dew point, Relative humidity and Wet bulb temperature.
b) Explain the working of differential pressure sensor.
c) Explain the working of air flow sensor.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) State the advantages of DDC.
b) Explain the optimum start and optimum stop control strategy used in energy management system.
c) Explain the features of operating system software used in DDC.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) State the functions of HVAC system.
b) Explain temperature control in AHU using variable air volume control.
c) Explain the working of chiller with the help of block diagram.

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Implement cooling coil temperature control loop with the help of P and ID diagram.
b) Develop an P and ID diagram used for static supply pressure control loop.
c) Draw P and ID diagram used for humidity control loop and explain the working.

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BOARD OF TECHNICAL EDUCATION

PORVORIM-GOA

April, 2025 Examinations

Programme: **Electronics & Instrumentation Engg.**

Subject: **Industrial Internet of Things (EX638)**

Time Duration: **3 Hrs.** Max. Marks: **75**

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable additional data if required.

Q.No.1. Answer any five of the following Questions: **5 x 3 = 15**

a) Describe in brief, sensors and connected devices in Industry 4.0 IIOT.

b) Describe in brief, three disadvantages of wireless sensor networks.

c) Explain how a water flow sensor communicates data with the Raspberry Pi?

d) Explain the meaning of network architecture erosion

e) Write a short note on pervasive legacy systems.

f) Describe three methods by which IoT can improve businesses.

Q.No.2. Answer any two of the following Questions: **2 x 6 = 12**

a) Describe any three applications of robotics in Industry 4.0.

b) Explain the following benefits of Industry 4.0:
i)Predictive maintenance ii)Demand prediction iii)Cost

c) Explain how Industry 4.0 benefits industry optimization.

Q.No.3. Answer any two of the following Questions: **2 x 6 = 12**

a) Draw the diagram of the OneM2M IoT standardized architecture to connect IoT devices, and describe the same.

b) Describe four categories of sensors used in IoT.

c) Describe in brief, any six characteristics to be considered for connecting smart objects.

Q.No.4. Answer any two of the following Questions: **2 x 6 = 12**

a) Write an algorithm for wireless monitoring of temperature using DHT11 and Raspberry Pi.

b) Explain the procedure to set-up and configure a Raspberry Pi system.

c) Describe any two specific features each, of any three cloud service platforms.

Q.No.5. Answer any two of the following Questions: **2 x 6 = 12**

a) Describe six challenges faced in data analytics in IoT.

b) Explain supervised and unsupervised machine learning techniques.

c) What are massively parallel processing databases and how do they function?

Q.No.6. Answer any two of the following Questions: **2 x 6 = 12**

a) Explain how IoT helps the oil and gas industry in improvement of operational efficiency.

b) With the help of a diagram, explain IoT-based architecture of a smart traffic management system for a smart city.

c) Explain connected manufacturing and how it benefits the manufacturing industry.

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