

B. TECH.
THEORY EXAMINATION (SEM-VIII) 2016-17
DIGITAL IMAGE PROCESSING

Time : 3 Hours

Max. Marks : 100

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:

10 x 2 = 20

- (a) Define Image. What is Dynamic range?
- (b) What is meant by illumination and reflectance?
- (c) Find the number of bits required to store a 256 X 256 image with 32 gray levels?
- (d) Explain the type of connectivity.
- (e) What is contrast stretching?
- (f) What do you mean by dilation and erosion?
- (g) Explain Noise model.
- (h) List edge detection operators.
- (i) Explain Affine transform.
- (j) Explain the concept of thresholding.



SECTION - B

2. Attempt any five parts of the following questions:

5 x 10 = 50

- (a) What is digital image processing? Draw a block diagram. And discuss some of its major applications.
- (b) Write a short note on
 - (i) Sampling and Quantization
 - (ii) Homomorphic filtering
- (c) Explain Histogram equalization. And equalize the given histogram.

Grey level								
Number of Pixel	790	1023	850	656	329	245	122	81

- (d) Define boundary extraction? Perform boundary extraction on image A with the help of structuring element B



- (e) What is Noise? Define any two noise models in detail.
- (f) What is Geometric transformation? Also discuss Euclidean Transformation.
- (g) How dilation and erosion is used in Morphological operations. How it is used in opening and closing operations.
- (h) Write a short note on
 - (i) Image Segmentation
 - (ii) Sampling and quantization
 - (ii) Illumination and reflectance

SECTION - C

Attempt any two parts of the following questions:

2 x 15 = 30

- 3 What are the different stages of digital image processing? Explain each stage in detail.
- 4 Explain the following in details
 - (i) Stereo Imaging
 - (ii) Region filling
 - (iii) Convex Hull
- 5 What is image restoration? Draw and explain the basic block diagram of the restoration process. Give two areas where restoration process can be applied?

B. TECH.

THEORY EXAMINATION (SEM-VIII) 2016-17

DATA COMPRESSION

Time : 3 Hours

Max. Marks : 100

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

SECTION - A

10 x 2 = 20

1. Attempt all parts of the following question:

- What do you understand by entropy ?
- What do you mean by loseless compression?
- Define data compression.
- Define compression ratio.
- Differentiate between Fidelity and quality.
- Discuss binary code.
- Discuss Huffman code
- Define distortion.
- Define the term PPM.
- Discuss Golomb coding.

SECTION - B

5 x 10 = 50

2. Attempt any five of the following questions:

- Explain rice coding and it's implementation.
- Explain minimum variance Huffman code.
- Explain encoding and decoding in LZW algorithm.
- Explain Adaptive Quantization.
- Explain prediction with partial match.
- Explain scalar & vector quantization.
- Explain modeling and coding with the help of example. What do you understand by prefix code?
- What are two observations on which Huffman procedure is based regarding optimum prefix code? What are the various applications of Huffman coding?

SECTION - C

Attempt any two of the following questions:

2 x 15 = 30

- What do you understand by adaptive quantization? Explain the various approaches to adapting the quantizer parameters.
- What is Facsimile Enoding? Explain Run-Length coding technique used earlier for Facsimile.
- What do you understand by Uniform quantizer? How uniform quantization of a uniformly distributed sources and uniform quantization of non-uniform sources is done?

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B. TECH.
THEORY EXAMINATION (SEM-VIII) 2016-17
POWER PLANT ENGINEERING

Time : 3 Hours

Max. Marks : 100

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

SECTION - A

1. Attempt all the following questions:

10 x 2 = 20

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|---------------------------------------|---|
| (a) Define boiler efficiency. | (g) Define biogas. |
| (b) Enumerate major source of energy. | (h) Write the function of baffles.. |
| (c) Write a short note on economiser. | (i) Define moderator. |
| (d) Define load factor. | (j) What is the difference between boiler mountings and boiler accessories? |
| (e) Define Demand factor. | |
| (f) Define volumetric efficiency | |

SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- Draw a neat line diagram of a diesel power plant showing all the systems.
- Explain with the help of a neat diagram the arrangement of the Fluidised Bed combustion system.
- Explain the following Lubrication system in a diesel engine:-
 - Wet pump Lubrication system
 - Dry pump Lubrication system
- Describe with the help of neat sketch the construction and working of Pressurized water Reactor.
- What do you understand by acid rain? What are the reasons for this? How they are controlled.
- What is the significance of load curve? What is a load duration curve?
- What is generator? How it is cooled?
- During a trial on an oil fired smoke tube boiler for one hour, following data were recorded:

Steam pressure = 15 bar, Amount of water evaporated = 5400 kg, condition of steam = 0.92, amount of fuel burnt = 540 kg, calorific value of fuel used = 42000 KJ/kg, temperature of steam leaving the superheater = 250°C, Temperature of feed water = 50°C.

Determine the equivalent evaporation from and at 100°C with and without super heater, boiler efficiency and the percentage of heat utilized in the superheater.

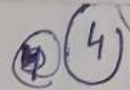
SECTION - C

Attempt any two of the following questions:

2 x 15 = 30

- A gas turbine has a pressure ratio of 6 and maximum cycle temperature of 800°C. The isentropic efficiencies of compressor and turbine are 0.82 and 0.85 respectively. Calculate the power output and thermal efficiency when the air enters compressor at 15°C and 1 bar.
- Explain the factor which shall be considered while selecting a site for Hydro- electric power plant Enumerate Essential elements of a Hydro Electric power plant.
- What do you mean by 'Supercritical Boilers' and 'Super charged Boiler'?

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**B.TECH.****THEORY EXAMINATION (SEM-VIII) 2016-17****TRANSPORTATION ENGINEERING – II***Time : 3 Hours**Max. Marks : 100**Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.***SECTION – A****1. Explain the following:****10 x 2 = 20**

- (a) Compare different modes of transport with reference to any two geometric design elements.
- (b) Why is it advisable to have narrow railway gauge in a mountainous country?
- (c) State the position of sleepers at points and crossings.
- (d) What does crossing in a railway track mean? What are its essential requirements?
- (e) Enumerate different methods of interlocking.
- (f) Why is a site on top of a hill considered more suitable for locating an airport than that on a valley?
- (g) Enumerate any four factors which affect the size of an airport.
- (h) Why is landing and takeoff operations performed along head winds?
- (i) Enumerate any two merits and de-merits of water transport.
- (j) List any four characteristics of vessels influencing the design of a harbor.

SECTION – B**2. Attempt any five of the following questions:****5 x 10 = 50**

- (a) Explain with neat sketches, the concept of 'coning' and discuss its merits and demerits.
- (b) Illustrate with neat sketches a single line and double line B.G track in embankments. Indicate the pattern of failure of an embankment and suggest remedies.
- (c) Explain any four methods adopted to control movements of train and compare their merits.
- (d) Define the different types of yards and explain their functions with neat sketches.
- (e) Explain the necessity of airports classification. Give different systems of classification of airports.
- (f) Explain with a neat sketch to show how 'lighting' is done on a runway.
- (g) Discuss airport drainage with a neat sketch.
- (h) Draw a layout of any one harbor in India, explain its salient features and list available terminal facilities.

SECTION – C**Attempt any two of the following questions:****2 x 15 = 30**

3. (i) A vehicle moving on a B.G track has a wheelbase of 4.724m. diameter of the wheel is 1524mm. flanges project 32mm below top of rail. Radius of curvature is 168m. determine extra width of flange.
- (ii) Illustrate with neat sketches various types of track junctions adopted by Indian railways. State their merits and the context in which each type is adopted.
4. (i) Explain with neat sketches, various 'markings' on a runway.

- (ii) The R.Ls of highest and lowest points along the length of a runway of above said airport are 98.5 and 96.5. apply correction for effective gradient and find the final corrected length of runway.
5. (i) Describe any eight factors of site investigation of harbors and the significance of each one of them.
- (ii) Give a brief account of any four coastal structures with neat sketches and state their location and functions.

B. TECH.

THEORY EXAMINATION (SEM-VIII) 2016-17
NON-DESTRUCTIVE TESTING

(2) (5)

Time : 3 Hours

Max. Marks : 100

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 question:

10 x 2 = 20

- (a) Define the term NDT.
- (b) Enlist the equipments used in visual inspection..
- (c) What do you mean by fluorescent dye?
- (d) What are the advantages of magnetic particle inspection?
- (e) What is emulsifier?
- (f) What is piezoelectricity?
- (g) What is acoustic emission?
- (h) Explain the function of Transducers in USM.
- (i) What is eddy current?
- (j) Define the term "Dwell time" used in Liquid penetrant test.

SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) What are the properties the penetrants must have in order to work well? Classify different types of penetrants.
- (b) What are the different sources of radiation used in radiographic inspection method?
- (c) What are different methods to generate magnetic fields? Differentiate between ferro-magnetic & Non-ferromagnetic materials.
- (d) How ultrasonic testing can help in medical diagnosis and inspecting welded joints?
- (e) Explain the technique of excess removal of penetrant from the workpiece surface.
- (f) Explain photo electric effect, Enumerate the limitations of radiographic inspection.
- (g) With neat sketch explain the method of ultrasonic testing and write its applications.
- (h) What is scattering factor? Describe the advantages of γ -ray radiography over X-ray radiography.

SECTION - C

Attempt any two of the following questions:

2 x 15 = 30

- 3 With neat sketch explain the principle, equipment and methodology used in X-ray radiography test.
- 4 With neat sketch explain the principle and working of eddy current inspection. Write five application of eddy current inspection.
- 5 What are the steps followed when conducting magnetic particle inspection? Explain the importance of magnetic field direction in flaw detection.

B. TECH.**THEORY EXAMINATION (SEM-VIII) 2016-17****PROCESS UTILITIES AND SAFETY IN CHEMICAL PLANTS**

Time : 3 Hours

Max. Marks : 100

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:

10 x 2 = 20

- (a) Underflow river water.
- (b) Safety.
- (c) Steam boiler.
- (d) Process Steam.
- (e) Exhaust Steam.
- (f) Compressors.
- (g) Air Filters.
- (h) Cryogenic insulation.
- (i) Disaster.
- (j) Hazard.

SECTION - B

2. Attempt any five parts of the following questions:

5 x 10 = 50

- (a) What do you mean by selection and sizing of boiler? Also discuss about flash tank.
- (b) Explain in detail about the various sources of water and their characteristics.
- (c) Explain in detail Water treatment process.
- (d) Discuss various process utilities available for cooling of the process streams and their range of application.
- (e) Discuss in detail for the distribution of water in a chemical process industry.
- (f) Discuss different types of steam traps with neat diagram.
- (g) Define super heater. Also explain the operation of steam condenser.
- (h) How are flammable and toxic chemical stored? What precaution is taken while handling of three chemical?

SECTION - C

3. Attempt any two parts of the following questions:

2 x 15 = 30

- 3. Discuss in detail about the disaster management. Also discuss Risk management routines and good operating practices and management.
- 4. Discuss the various methods available for the analysis of loss prevention in chemical engineering.
- 5. Write short notes on the following:
 - (i) Reaction hazard index.
 - (ii) Interlocks, alarms, trips.
 - (iii) Plant layout.
 - (iv) Role of computer in safety.

B.TECH.

THEORY EXAMINATION (SEM-VIII) 2016-17
NON CONVENTIONAL ENERGY RESOURCES

Time : 3 Hours

Max. Marks : 100

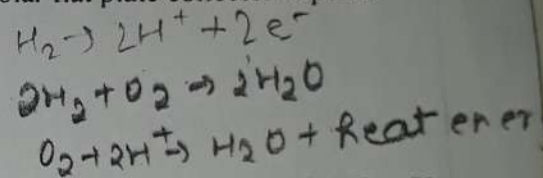
Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION - A

1. Explain the following:

10 x 2 = 20

- (a) State Seebeck Effect and Peltier Effect.
- (b) Write the chemical reaction takes place in Alkaline Fuel Cell.
- (c) What is an aerobic digestion?
- (d) Define solar constant. What is its standard value?
- (e) Discuss the terms Energy conservation and Energy audit.
- (f) What is the maximum energy conversion efficiency of a wind turbine for a given swept area?
- (g) Define Fill Factor.
- (h) On what factors does the collector efficiency of a solar flat plate collector depend?
- (i) What is OTEC? Discuss in brief.
- (j) Describe various Geothermal Energy Resources.



SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) Discuss the main features of various types of renewable and non-renewable energy sources. Also explain the importance of non-conventional energy sources in the context of global warming.
- (b) Classify different types of solar thermal collector and show the constructional details of a flat plate collector. What are its main advantages?
- (c) Explain the mechanism of photoconduction in a PV cell.
- (d) Explain the process of gasification of solid biomass. What is the general composition of the gas produced and what is its heating value? What are its applications?
- (e) Explain the 'Single Basin' and 'Two Basin' systems of tidal power harnessing. Discuss their advantages and limitations.
- (f) Explain the essential features of a hydrogen-oxygen cell. Draw a suitable diagram of this cell and give the reactions took place at the electrodes.
- (g) With the help of a schematic diagram, explain the operation of closed cycle MHD generating system.
- (h) Explain the process of production of biogas from biomass. Describe Deen Bandhu Biogas plant.

SECTION - C

Attempt any two of the following question :

2 x 15 = 30

3. What are the most favorable sites for installing wind turbines? Using Betz model of a wind turbine, derive the expression for power extracted from wind. Under what condition does the maximum theoretical power can be extracted from the wind turbine?

Write short notes on: i) Practical problems associated with MHD power generation.

ii) Solar Cell Arrays. iii) Vertical Axis Wind Mills.

5. Describe the principle of working and constructional details of basic thermionic generator. What is the basic difference between thermoelectric and thermionic conversion systems? Also, explain the working of thermoelectric generators.

B. TECH.

THEORY EXAMINATION (SEM-VIII) 2016-17

ADVANCE SEPARATION TECHNOLOGY

Time : 3 Hours

Max. Marks : 100

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

SECTION - A

10 x 2 = 20

1. Attempt all parts of the following questions:

- ✓(a) What is the separation process?
- (b) Describe the Henry's law.
- ✓(c) Differentiate between single stage and multistage separation process.
- ✓(d) What is separation factor?
- ✓(e) What is the importance of separation process?
- ✓(f) Define osmotic pressure.
- ✓(g) What is cascade?
- ✓(h) Define SDI. *Silt Density Index.*
- ✓(i) Define MWCO.
- ✓(j) Define membrane permeability.

SECTION - B

5 x 10 = 50

2. Attempt any five of the following questions:

- ✓(a) What is reverse osmosis? Explain the effect of concentration polarization on this separation process.
- ✓(b) What is the difference between equilibrium governed separation processes and rate governed separation processes?
- ✓(c) Briefly discuss the need of cascades in separation process.
- ✓(d) Write a note on energy requirement for separation process.
- (e) Define and explain ultra filtration process with neat sketch and give the flux equation of the ultra filtration process.
- (f) Describe the gas permeation through polymerized membranes. Mention the different kinds of polymerized membranes.
- ✓(g) Describe the processes of dialysis and also of electro-dialysis. Write their applications. Also give few examples of electro-dialysis.
- (h) Calculate the flux and the rate of removal of urea at steady state in g/hr. from blood in a cellophane dialyzer at 37°C. The membrane is 0.025 mm thick and has an area of 2.0 m². The mass transfer coefficient on the blood side is estimate as $Kc_1 = 1.25 \times 10^{-5}$ m/sec. The permeability of membrane is 8.73×10^{-6} m/sec. the concentration of urea in the blood is 0.02g urea/100ml and that in the dialyzing fluid will be assumed as zero.

SECTION - C

2 x 15 = 30

Attempt any two of the following questions:

- 3. Define and explain the chromatographic separation process and its various types. Also write its advantages and disadvantages.
- 4. Discuss in detail about the different types of molecular sieves giving their uses and working principle and operation.
- 5. Write the short notes on the following
 - (i) Ionic membranes
 - (ii) Gas permeability
 - (iii) Pervaporation

B. TECH.
THEORY EXAMINATION (SEM-VIII) 2016-17
PLANT DESIGN AND PROJECT ENGINEERING

Time : 3 Hours

Max. Marks : 100

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

SECTION - A

10 x 2 = 20

1. Explain the following:

- (a) Name any four methods of calculating depreciation
- (b) What is meant by capitalized cost? Where is it used?
- (c) What do you mean by fixed costs and variable costs?
- (d) Define annuity and its type
- (e) What do you mean by obsolescence?
- (f) Define salvage value and scrap value
- (g) Define present worth and discount
- (h) A storage tank was priced at Rs 5000 in 1982 when the cost index was 460. What is its value today when the cost index is 800?
- (i) What are the various safety and fire protective measures considered in plant design?
- (j) What are the principal factors to be considered for plant layout?

SECTION - B

5 x 10 = 50

2. Attempt any five of the following questions:

- (a) What do you mean by pilot plant? What is importance of pilot plant in process development?
- (b) Discuss in brief about the factors to be considered in Plant location and site selection
- (c) Discuss the types of cost indices available in the Chemical Engineering literature. Discuss the importance of these cost indices for cost estimation of chemical engineering equipment.
- (d) Write a brief note on "Importance of Process Economics to Chemical/ Petrochemical Engineers"
- (e) Explain any two methods of depreciation in detail
- (f) Discuss about the cash flow analysis.
- (g) The annual direct production costs for a plant operating at 70 percent capacity are \$280,000 while the sum of the annual fixed charges, overhead costs, and general expenses is \$200,000. What is the break-even point in units of production per year if total annual sales are \$560,000 and the product sells at \$40 per unit? What were the annual gross earnings and net profit for this plant at 100 percent capacity in 1988 when corporate income taxes required a 15 percent tax on the first \$50,000 of annual gross earnings, 25 percent on annual gross earnings of \$50,000 to \$75,000, 34 percent on annual gross earnings above \$75,000, and 5 percent on gross earnings from \$100,000 to \$335,000?
- (h) Give an optimization scheme, which may be followed for determination of optimum height and diameter of a sieve tray distillation column?

SECTION - C

2 x 15 = 30

Attempt any two of the following questions:

3. A plant is producing 10,000 t/y of a product. The overall yield is 70 per cent, on a basis (kg of product per kg raw material). The raw material costs £10/t and the product sells for £35/t. A process modification has been devised that will increase the yield to 75 per cent. The additional investment required is £35,000, and the additional operating costs are negligible. Is the modification worth making?
4. It is desired to \$1000 to meet a financial obligation. This money can be borrowed from a loan agency at a monthly interest rate of 2 percent. Determine the following:
 - (i) The total amount of principal plus simple interest due after 2 years if no intermediate payments are made
 - (ii) The total amount of principal plus compounded interest due after 2 years if no intermediate payments are made
 - (iii) The nominal interest rate when the interest is compounded monthly
 - (iv) The effective interest rate when the interest is compounded monthly
5. Write short notes on the following:
 - (i) Pay-back time
 - (ii) Sensitivity analysis
 - (iii) Discounted cash flow (time value of money)
 - (iv) method of steepest ascent or descent
 - (v) Optimization

(9)