

Dec 2019 B.Tech

MG

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ME) (2018 Batch) (Sem.-3)

MACHINE DRAWING

Subject Code : BTME-303-18

M.Code : 76419

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. There are three sections in this question paper. Attempt ALL the questions from SECTION-A.
2. Attempt any TWO questions from SECTION-B and any ONE question from SECTION-C.
3. First angle projection to be used. You may assume any missing dimension.

SECTION-A

Q1. Write briefly :

- | | |
|---|---|
| a) Explain clearance fit, transition fit and interference fit. | 2 |
| b) Draw a machining symbol to represent a surface roughness (R_a) value of $1.5 \mu\text{m}$ to be obtained by using milling process for machining? | 2 |
| c) How internal threads are shown in sections? Explain with drawings. | 2 |
| d) What is function of clearance in cotter joint? | 2 |
| e) What is a lock nut? Where is it used? | 2 |
| f) What is expansion joint? | 2 |
| g) What is application and function of a feed check valve? | 2 |
| h) What is a T-Bolt and where is it used? | 2 |
| i) What is a revolved section? Explain with the help of a drawing. | 2 |
| j) What is application of foot step bearing? | 2 |

- SECTION-B (FREEHAND SKETCHING)**
- Q2. Draw freehand sketch of top half sectioned front view of pin type flexible coupling. 5
- Q3. Draw freehand sketches of front view and top view of a cotter joint. 5
- Q4. Draw a freehand sketch of flanged pipe joint. 5

- SECTION-C**
- Q5. Assemble the parts of Connecting rod given in Fig. 1 and draw the following views (with bill of materials) :
- a) Elevation
- b) Top view (full section)

30

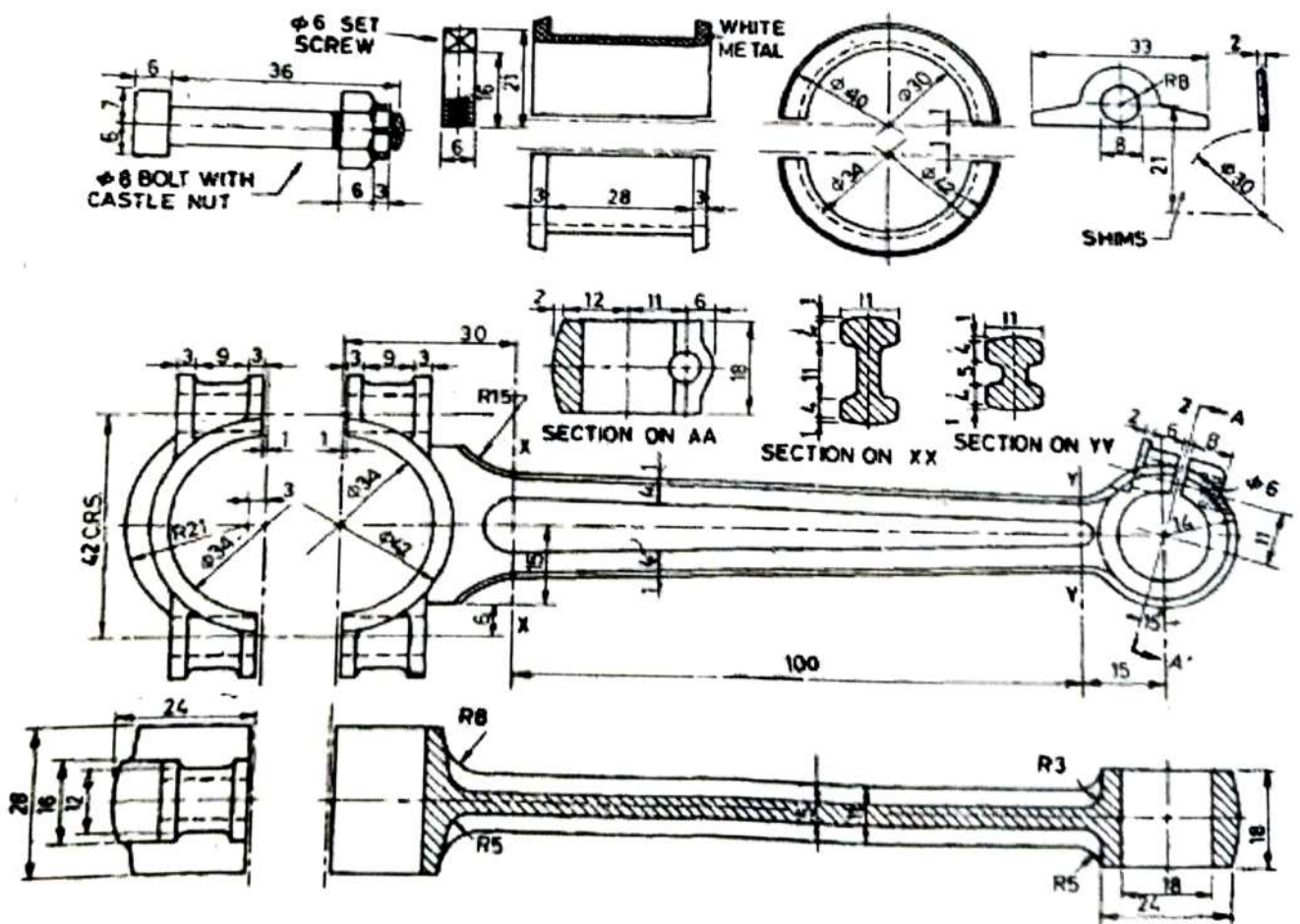


Fig. 1

Q6. Assemble the parts of a **Plummer block** given in Fig.2 and draw the following views (with bill of materials):

- a) Elevation left half in section
- b) Plan

30

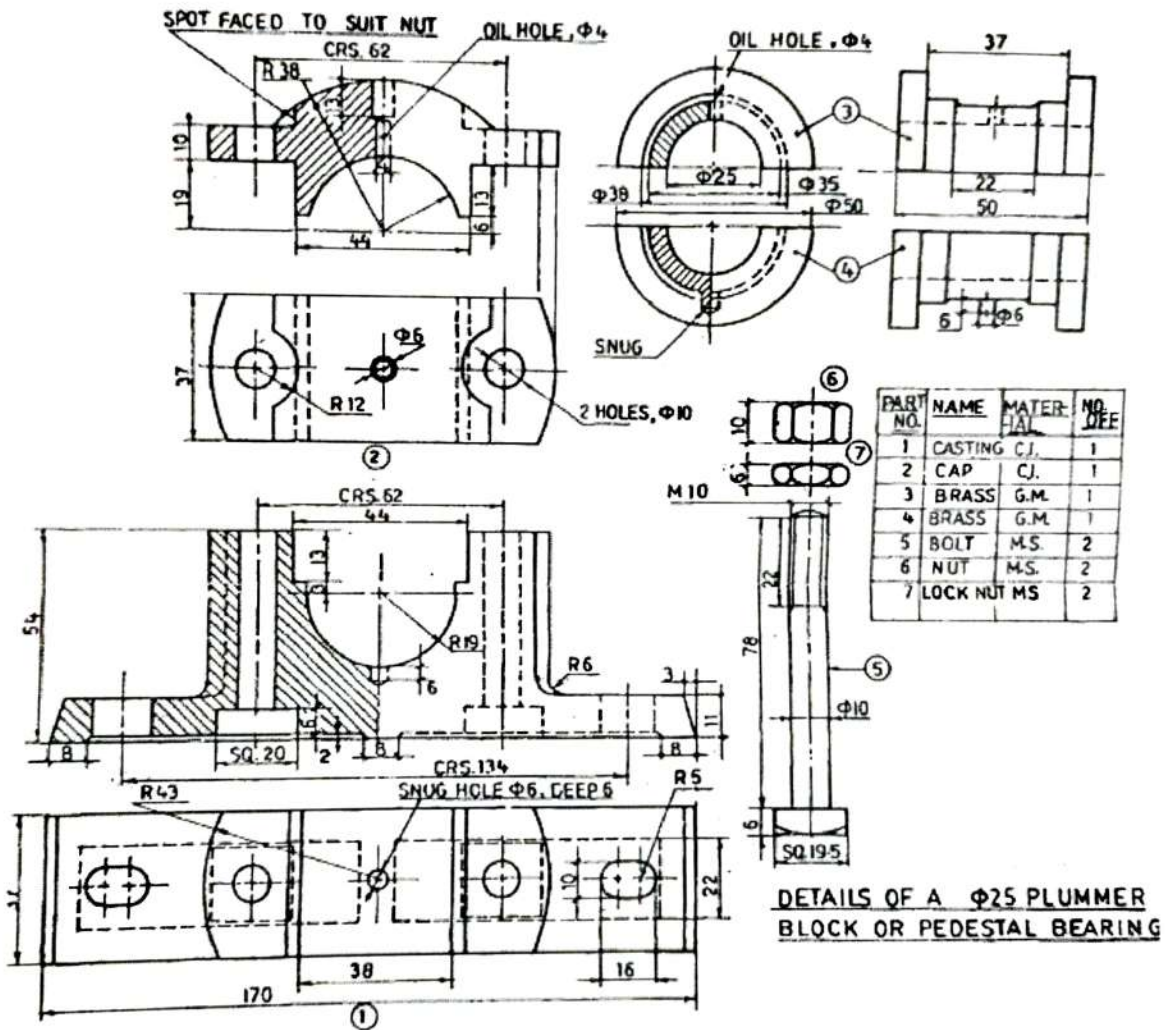


Fig. 2

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SECTION-B

2. Explain with the help of (temperature-heat) diagram the formation of steam and the connected terms.
3. Explain the working of Loeffler boiler with the help of a neat sketch. State its merits.
4. Steam enters a group of nozzles of a steam turbine at 12 bar and 220°C and leaves at 1.2 bar. The steam turbine develops 220 KW with specific steam consumption of 13.5 Kg/KWh. If the diameter of nozzles at throat is 7 mm, calculate the number of nozzles.
5. Explain construction and working of Edwards's air pump.
6. A steam power plant is supplied with dry saturated steam at a pressure of 12 bar and exhausts into a condenser at 0.1 bar. Calculate the Rankine efficiency by using 1. Steam tables and 2. Mollier chart.

SECTION-C

7. What is the significance of controlling delay period in C.I. engines? Explain any five factors which cause reduction in delay period.
8. In a condenser test, the following observations are made : Vacuum = 690 mm of Hg; Barometer reading = 750 mm of Hg; Mean temperature of condensation = 35°C ; Hot well temperature = 28°C ; Mass of cooling water = 50000 kg/h; Inlet temperature = 17°C ; Outlet temperature = 30°C ; Mass of condensate per hour = 1250 kg.
Find :
 - a. The mass of air present per m^3 of condenser volume;
 - b. The state of steam entering the condenser; and
 - c. The vacuum efficiency. Take R for air = 287 J/Kg K.
9. A parson's reaction turbine, while running at 400 r.p.m. consumes 30 tonnes of steam per hour. The steam at a certain stage is at 1.6 bar with dryness fraction of 0.9 and the stage develops 10 KW. The axial velocity of flow is constant and equal to 0.75 of the blade velocity. Find mean diameter of the drum and the volume of steam flowing per second. Take blade tip angles at inlet and exit as 35° and 20° respectively.

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Roll No.

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (ME) (2018 Batch) (Sem.-3)

BASIC THERMODYNAMICS

Subject Code : BTME305-18

M.Code : 76422

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :
 - a. State the conditions for a process to be reversible.
 - b. Define Zeroth law of thermodynamics.
 - c. Define Thermodynamic work.
 - d. Define Enthalpy.
 - e. What is throttling process?
 - f. What is heat pump? How it differs from a refrigerator?
 - g. State Entropy principle.
 - h. What is air standard efficiency?
 - i. What is explosion ratio?
 - j. How I.C. engines are classified?

SECTION-B

2. Explain the terms state, path, process and cycle.
3. Write the similarity and dissimilarities between work and heat.
4. State first law of thermodynamics and write its corollaries.
5. A reversible heat engine delivers 0.6 kW power and rejects heat energy to a reservoir at 300 K at the rate of 24 kJ/min. Make calculation for the engine efficiency and the temperature of the thermal reservoir supplying heat to the engine.
6. Explain the process of steam generation at constant pressure and show the various stages on p - v and T - v diagrams.

SECTION-C

7. Derive analytical expression to find the work done, heat supplied and change in internal energy in adiabatic process.
8. Derive expression for steady flow energy equation and discuss its various engineering applications.
9. Define an expression for the air standard efficiency of the Diesel cycle in terms of the compression ratio, cut off ratio and the adiabatic index.

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SECTION-B

2. Write a note on two dimensional stress systems with a suitable example.
3. A cantilever PQRS, 7 m long is fixed at P such that $PQ = QR = 2$ m, and $RS = 3$ m. It carries loads of 3 kN, 3 kN and 2 kN at Q, R and S respectively in addition to uniformly distributed load of 1 kN/m run between P and Q and 2 kN/m run between R and S. Draw shearing force and bending moment diagrams.
4. A hollow circular bar having outside diameter twice the inside diameter is used as a beam. From the bending moment diagram of the beam, it is found that the bar is subjected to a bending moment of 40 kNm. If the allowable bending stress in the beam is to be limited to 100 MN/m^2 , find the inside diameter of the bar.
5. Derive the torsion formula.
6. A slender pin ended aluminium column 1.8 m long and of circular cross-section is to have an outside diameter of 50 mm. Calculate the necessary internal diameter to prevent failure by buckling if the actual load applied is 13.6 kN and the critical load applied is twice the actual load. Take, E for aluminium as 75 GN/m^2 .

SECTION-C

7. (a) Explain stress strain diagram for brittle materials.
(b) Describe ellipse of stress and its applications.
8. A steel girder of uniform section, 14 metres long is simply supported at its ends. It carries concentrated loads of 90 kN and 60 kN at two points 3 metres and 4.5 metres from the two ends respectively. Using Macaulay's method, calculate:
(a) The deflection of the girder at the points under the two loads, and
(b) The maximum deflection. Take, $I = 64 \times 10^{-4} \text{ m}^4$, and $E = 210 \times 10^6 \text{ kN/m}^2$.
9. A hollow shaft of diameter ratio $3/8$ is required to transmit 600 kW at 110 rpm, the maximum torque being 20% greater than the mean. The shear stress is not to exceed 63 MN/m^2 and the twist in a length of 3 m not to exceed 1.4 degrees. Calculate the maximum external diameter satisfying these conditions. Take, modulus of rigidity as 84 GN/m^2 .

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SECTION-B

2. What are straight line mechanisms? Describe one type of exact straight line motion mechanism with the help of a sketch.
3. Discuss briefly the various types of belts used for the transmission of power.
4. The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 meters. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m, find the maximum and minimum speeds.
5. What is the function of a flywheel? How does it differ from that of a governor?
6. Write short note on coefficient of insensitiveness of governors.

SECTION-C

7. What is the significance of degrees of freedom of a kinematic chain when it functions as a mechanism? Give examples.
8. A cam is to give the following motion to a knife-edged follower :
 - a. Outstroke during 60° of cam rotation;
 - b. Dwell for the next 30° of cam rotation;
 - c. Return stroke during next 60° of cam rotation, and
 - d. Dwell for the remaining 210° of cam rotation.

The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when

 - a. The axis of the follower passes through the axis of the cam shaft, and
 - b. The axis of the follower is offset by 20 mm from the axis of the cam shaft.
9. Discuss the controlling force and stability of a governor and show that the stability of a governor depends on the slope of the curve connecting the controlling force (F_C) and radius of rotation (r) and the value (F_C/r).

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SECTION-B

2. Describe various factors for selection of manufacturing processes.
3. Explain the construction and working of cupola giving a neat sketch.
4. Explain the working principle, applications, advantages and limitations of AC welding process giving a neat sketch.
5. Explain the elements of gating system giving a neat sketch and explain the significance of various elements.
6. What is dye penetrant test? Explain cleaners, penetrants and developers.

SECTION-C

7.
 - a. Describe the working principle, applications and advantages of investment casting process giving neat sketch.
 - b. Explain the working principle of resistance welding process giving a neat sketch. Also explain the spot welding process with the help of neat sketch.
8.
 - a. What do you understand by heat affected zone (HAZ) in welding? How does HAZ affect weld zone performance?
 - b. Describe the working principle of thermit welding process giving a neat sketch and also explain its applications.
9.
 - a. Discuss various types of welding defects, their causes and remedies.
 - b. Explain principles of Eddy Current Testing (ECT). What do you understand by sensitivity in ECT? Narrate one application of ECT.

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SECTION-B

2. A steel bar is 900 mm long; its two ends are 40 mm and 30 mm in diameter and the length of each rod is 200 mm. The middle portion of the bar is 15 mm in diameter and 500 mm long. If the bar is subjected to an axial load of 15 kN, find its total extension. Take, $E = 200 \text{ GN/m}^2$.
3. A cantilever of length 10 m carries point loads of 3kN and 5 kN at distance of 3 m and 6 m respectively from free end, and uniformly distributed load of 2 kN/m between two point loads. Draw shearing force and bending moment diagram.
4. What must be the length of a 5 mm diameter aluminium wire so that it can be twisted through one complete revolution without exceeding a shearing stress of 42 MN/m^2 ? Take, modulus of rigidity = 27 GN/m^2 .
5. Distinguish between the application of Euler's formula and Rankine-Gordon's formula giving suitable examples.
6. Use double integration method to find slope and deflection at free end of a cantilever of length l carrying uniformly distributed load w per unit length over whole length.

SECTION-C

7. Draw the Mohr's stress circle for direct stresses of 65 MN/m^2 (tensile) and 35 MN/m^2 (compressive) and estimate the magnitude and direction of the resultant stresses on planes making angles of 20° and 65° with the plane of the first principal stress. Find also the normal and tangential stresses on these planes.
8. Two wooden planks $150 \text{ mm} \times 50 \text{ mm}$ each are connected to form a T-section of a beam. If a moment of 3.4 kNm is applied around the horizontal neutral axis, inducing tension below the neutral axis, find the stresses at the extreme fibres of the cross-section. Also calculate the total tensile force on the cross-section.
9. Write short notes on :
 - (a) Ellipse of stress and its applications
 - (b) Moment area method to find slope and deflection

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SECTION-B

2. Discuss the concept of diffusion and explain steady-state and non-steady-state diffusion.
3. Discuss general principles of phase transformations in alloys.
4. Discuss in general the basic procedure of carburizing and nitriding.
5. Discuss the classifications and compositions of ferrous metals and their alloys.
6. Discuss the concept of Harden-ability.

SECTION-C

7. Discuss Iron carbon equilibrium diagram and discuss various phases of transformations.
8. Discuss in detail the defects due to heat treatment and their remedies.
9. Discuss the concept of plastic deformation and re-crystallization?

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SECTION-C

Q6) Figure 1 show the detail of a Plummer Block. Assemble the given components and draw the front view (Right half in section), top view and side view of assembly.

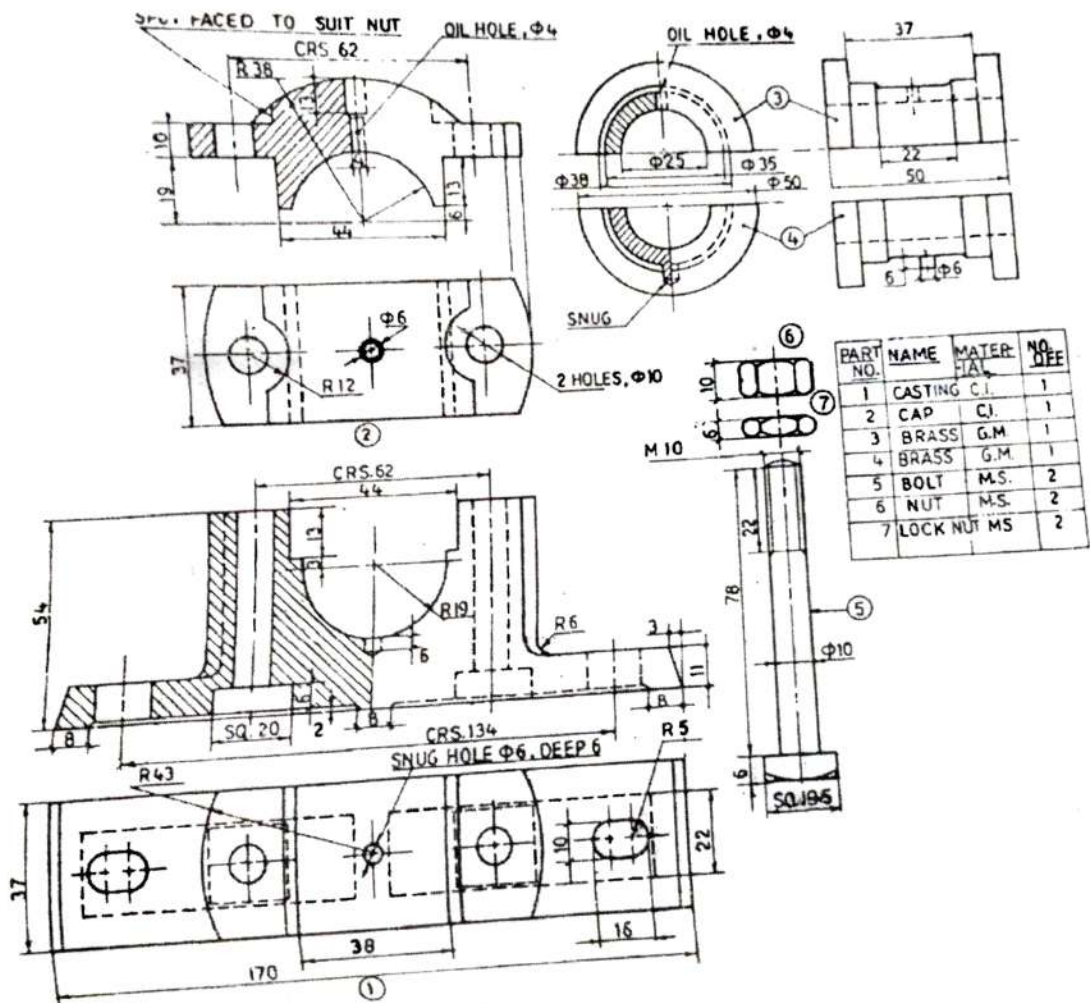


Fig 1: Details of Plummer Block

Fig.1

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B.Tech.(ME) (2018 Batch) (Sem.-3)
BASIC ELECTRONICS ENGINEERING
Subject Code : BTEC305-18
M.Code : 76420

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Define breakdown voltage and knee voltage.
- b) Define Zener Diode.
- c) What do you mean by integrated circuits?
- d) What is the working principle of op-Amp?
- e) Give the working principle of simple diode.
- f) Draw the VI characteristic of diode.
- g) Convert 101011 into Decimal system & Octal system.
- h) Write the truth table of universal gates.
- i) State the functions of flip flops.
- j) Draw the symbolic representation of BJT and FET.

SECTION-B

2. Explain VI characteristics of Zener diode at biasing voltage 1.1ev.
3. Compare conductor, semiconductors and insulators in detail.
4. Describe the concept of bias stabilization in PNP transistor.
5. Perform the following addition by 2's complement
 - a) 20 to -26
 - b) 25 to -15.
6. What are various laws for Boolean logic simplification?

SECTION-C

7. What are various applications of Op-Amp? Explain in detail.
8.
 - a) What are the different logic gates? Give their truth tables.
 - b) Discuss the working of a full wave rectifier.
9. Draw the equivalent circuit & truth table of RS Flip-Flop.

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SECTION-B

2. Explain the different types of constrained motion with suitable examples.
3. Write the classification of Cams with suitable sketch.
4. Distinguish between brakes and dynamometers.
5. Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor.
6. In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever.

SECTION-C

7. Give a neat sketch of the straight line motion 'Hart mechanism'. Prove that it produces an exact straight line motion.

8. For a flat belt, prove that $\frac{T_1}{T_2} = e^{\mu\theta}$ where

T_1 = Tension in the tight side of the belt,

T_2 = Tension in the slack side of the belt,

μ = Coefficient of friction between the belt and the pulley, and

θ = Angle of contact between the belt and the pulley (in radians.)

9. A certain machine requires a torque of $(5000 + 500 \sin \theta)$ N-m to drive it, where θ is the angle of rotation of shaft measured from certain datum. The machine is directly coupled to an engine which produces a torque of $(5000 + 600 \sin 2 \theta)$ N-m. The flywheel and the other rotating parts attached to the engine has a mass of 500 kg at a radius of gyration of 0.4 m. If the mean speed is 150 r.p.m., find: 1. the fluctuation of energy, 2. the total percentage fluctuation of speed, and 3. the maximum and minimum angular acceleration of the flywheel and the corresponding shaft position.

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B.Tech.(ME) (2018 Batch) (Sem.-3)

THEORY OF MACHINES – I

Subject Code : BTME-302-18

M.Code : 76418

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

- Write briefly :
 - Write the various types of links.
 - Differentiate between a machine and a structure.
 - What is the condition for correct steering?
 - What are different types of chains?
 - State laws of fluid friction.
 - Write the different types of brakes.
 - What is stability of a governor?
 - Write the difference between lower and higher pairs.
 - What is quarter turn drive?
 - Name the materials used for making belts.

SECTION-B

- Explain the different types of constrained motion with suitable examples.
- Write the classification of Cams with suitable sketch.
- Distinguish between brakes and dynamometers.
- Explain the term height of the governor. Derive an expression for the height in the case of a Watt governor.
- In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever.

SECTION-C

- Give a neat sketch of the straight line motion 'Hart mechanism'. Prove that it produces an exact straight line motion.
- For a flat belt, prove that $\frac{T_1}{T_2} = e^{\mu\theta}$ where
 - T_1 = Tension in the tight side of the belt,
 - T_2 = Tension in the slack side of the belt,
 - μ = Coefficient of friction between the belt and the pulley, and
 - θ = Angle of contact between the belt and the pulley (in radians.)
- A certain machine requires a torque of $(5000 + 500 \sin \theta)$ N-m to drive it, where θ is the angle of rotation of shaft measured from certain datum. The machine is directly coupled to an engine which produces a torque of $(5000 + 600 \sin 2\theta)$ N-m. The flywheel and the other rotating parts attached to the engine has a mass of 500 kg at a radius of gyration of 0.4 m. If the mean speed is 150 r.p.m., find:
 - the fluctuation of energy,
 - the total percentage fluctuation of speed, and
 - the maximum and minimum angular acceleration of the flywheel and the corresponding shaft position.

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SECTION-B

2. Derive an expression to find Metacentric height analytically.
3. The velocity potential function for a two dimensional flow is given by $x(2y - 1)$, calculate the velocity at the point (4,5). Find the stream function at this point also.
4. Derive continuity equation in cylindrical coordinates.
5. Derive Euler's equation of motion.
6. Discuss free and forced vortex motions.

SECTION-C

7. The resisting force F of a plane during flight can be considered as dependent upon the length of aircraft, velocity, air viscosity, air density and bulk modulus of air. Express the functionality relationship between these variables and the resisting force using dimensional analysis. (10)
8. (a) A Rectangular channel 2 m wide has a discharge of 250 litres/s, which is measured by a right angled V-notch weir. Find the position of apex of the notch from the bed of the channel if maximum depth of water is not to exceed 1.3m. Take $C_d = .62$. (6)
(b) State advantages of triangular notch over rectangular notch. (4)
9. Show that energy correction factor for laminar flow through a circular pipe is 2. (10)

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3. What are the free body diagrams of a mechanism? Explain the implementation of this concept for a slider-crank mechanism.
4. Explain the 'direct and reverse crank' method for determining unbalanced forces in radial engines.
5. A pinion of 20 involute teeth and 12.5 cm pitch circle diameter drives a rack. The addendum of both pinion and rack is 6.25 mm. What is the least pressure angle which can be used to avoid interference?
6. Discuss the least square technique. How is it useful in designing a four link mechanism when three positions of the input and output link are known?

SECTION-C

7. A single cylinder vertical engine has a bore of 30 cm, a stroke 36 cm and a connecting rod of length 72 cm. The weight of the reciprocating part is 130 kg. When the piston is at quarter stroke from TDC and is moving downwards, the net pressure on it is 0.6 MPa. If the speed of the engine is 250 *r.p.m.*, calculate the turning moment on the crankshaft at the instant corresponding to the position stated above.
8. Two shafts A and B are coaxial. The gear C (50 teeth) is rigidly mounted on shaft A and a Compound gear D-E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. Gear G is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B.
 - a) Sketch the arrangement.
 - b) Find the number of teeth on internal gear G assuming that all gears have the same module.
 - c) If the shaft A rotates at 110 *r.p.m.*, find the speed of shaft B.
9. Explain the effect of the gyroscopic couple on the reaction of the four wheels of a vehicle negotiating a curve with neat and clean diagram.

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Total No. of Pages : 02

B.Tech.(ME) (2012 Onwards) (Sem.-4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-401

M.Code : 59129

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Answer briefly :

- (a) What do you mean by proof of resilience?
- (b) What is energy of distortion?
- (c) What is generally accepted criterion of failure of a component?
- (d) What is maximum principal strain theory?
- (e) Describe various types of springs.
- (f) Why we use gauge pressure instead of absolute pressure in calculation of stresses in thin cylinders?
- (g) For a crane hook, locate the plane, which is the severely stressed.
- (h) State any two assumptions made in the analysis of curved beams.
- (i) What is the importance of shear centre?
- (j) Which type of stresses are produced in a rotating thin disc of uniform thickness?

SECTION-B

2. State and explain Maxwell's theorem of reciprocal deflection.
3. Explain why no single theory of failure can satisfy the condition of failure for all the materials.
4. A thin cylinder of 200 mm inside diameter is 4 mm thick. The ends of the cylinder are closed by rigid plates and then it is filled with water under pressure. If external axial pull of 75 kN is applied to the ends, the water pressure falls by 0.12 MPa. Find the value of poisson's ratio. $K = 2100 \text{ MPa}$ and $E = 150 \text{ GPa}$.
5. A compound cylinder is formed by shrinking one tube to another, the inside and outside diameters of the outer tube being 120 mm and 180 mm respectively and of the inner tube being 60 mm and 120 mm respectively. After shrinking the radial pressure at the common surface is 30 MPa. If the cylinder is subjected to an internal pressure of 80 MPa, determine the final stresses set up at various surfaces of the cylinder.
6. A steel ring of 240 mm mean diameter has a rectangular cross-section of 60 mm x 40 mm, the larger section being in the radial direction. Determine the tensile force which the ring can carry safely if the permissible stresses is 140 MPa.

SECTION-C

7. An open coil helical spring has 10 coils and is made out of a 12 mm diameter steel rod. The mean diameter of the coils is 80 mm and the helix angle 15° . Find the deflection under an axial load of 250 N. What are the maximum intensities of direct and shear stresses induced in the section of the wire? If the above load is replaced by an axial torque of 60N-m, determine the axial deflection and the angle of rotation about the axis of the coil. Take G as 80 GPa and E as 204 GPa.
8. A solid disc of uniform thickness and having diameter of 400 mm rotates at 7500 rpm. Determine the radial and hoop stresses at radii of 0, 50 mm, 100 mm and 200 mm. Density of the material is 7500 kg/m^3 . What are the maximum values of the radial, hoop and shear stresses?
9. A cast iron bracket of I-section has its top flange as 200 mm x 40 mm, bottom flange as 120 mm x 40 mm and the web as 300 mm x 40 mm. The overall depth of the section is 380 mm. The bracket is subjected to bending. If the maximum tensile stress in the top flange is not to exceed 15 MPa, determine the bending moment the section can take. If the beam is subjected to a shear force of 150 kN, sketch the stress distribution over the depth of the section.

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- Q3 Explain the construction and working of forging press giving a neat sketch.
- Q4 Explain the methods of obtaining metal powders used in powder metallurgy process with the help of neat sketches.
- Q5 Explain the cutting forces encountered in machining operations. How these cutting forces can be measured?
- Q6 Explain the construction and working principle of surface grinding machine giving appropriate line diagram and also explain its applications.

SECTION-C

- Q7 a) Describe the press and die setup. Also explain the forging operations using progressive and combination dies giving neat sketches.
- b) Explain the working of horizontal milling machine giving a neat sketch and describe components of horizontal milling machine.
- Q8 a) What is the need of using coolants and lubricants in machining operations? Describe the functions and properties of various lubricants used in machining operations.
- b) Describe the characteristic features, advantages, disadvantages of various types of cutting tool materials used in machining operations.
- Q9 a) A tool life test of HSS/ Carbide tool material used to cut a special Die Steel of 275 BHN gave the following results.

Spindle speed	372	329	258
L (mm)	38.2	82.3	380

Here the spindle speed units are (rev/min) and (L) is the length of travel (mm) of the lathe carriage up to the failure of each tool. Assume the work piece diameter as 0.090 m, feed rate as 0.5 mm/rev and depth of cut as 0.95 mm. Calculate the constants of tool life equation $VT^n = C$. Determine the tool life to be expected when cutting at 135 rpm. Also specify whether the tool material is HSS or Carbide.

- b) Explain the nomenclature of grinding wheel giving brief description of various elements.

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4. A simple closed cycle gas turbine plant receives air at 1 bar and 15°C , and compresses it to 5 bar and then heats it to 800°C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take C_p for air is 1 KJ/Kg K.
5. Explain the effect of intercooling in a multistage reciprocating compressor.
6. The turbojet engine requires 0.18 kg per hour per N of thrust, when the thrust is 9 KN. The aircraft velocity is 500 m/s and mass of air passing through the compressor of the turbine is 27 kg per second. Determine the air-fuel ratio, thrust power and overall efficiency of this unit

SECTION-C

7. Explain why aerofoil blading is needed in axial flow compressors? Define angle of attack and its effects on static pressure distribution on blades.
8. A 4 cylinder double acting compressor is required to compress $30\text{ m}^3/\text{min}$. of air at 1 bar and 27°C to a pressure of 16 bar. Determine the size of motor required and cylinder dimensions if the following data is given :
 - i) Speed of the compressor $N = 320\text{ r.p.m}$,
 - ii) Clearance volume $V_c = 4\%$,
 - iii) Stroke to bore ratio $L/D = 1.2$,
 - iv) Mechanical efficiency = 82%
 - v) Value of index $n = 1.32$. Assume no pressure change in suction valves and the air gets heated by 12°C during suction stroke.
9. i) Write a short note on :
 - a) Turbo prop
 - b) Ram jet.
- ii) Compare vane blower and root blower rotary compressors.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

SECTION-B

2. Derive an expression for total force and centre of pressure for horizontal plane surface submerged in liquid.
3. A block of wood of specific gravity 0.7 floats in water. Determine the meta-centric height of the block if its size is $2\text{m} \times 1\text{m} \times 0.8\text{m}$.
4. If for a two dimensional stream function is $2xy$, determine the velocity at point $P(2,3)$. Also calculate the value of potential function at point P .
5. A pipeline carrying oil of specific gravity 0.87, changes in diameter from 200mm diameter at position A to 500mm diameter at a position B which is 4m at a higher level. If the pressures at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and discharge is 200 liters/s determine loss of head.
6. Find the kinematic viscosity of oil having density 981kg/m^3 . The shear stress at a point in oil is 0.2452N/m^2 and velocity gradient at that point is 0.2 per second.

SECTION-C

7. Derive an expression for the loss of head due to friction in pipes.
8. The pressure difference in a pipe of diameter D and length l due to turbulent flow depends on the velocity, dynamic viscosity, density and roughness k . Using Buckingham pi theorem express pressure in terms of dimension less parameters.
9. An open channel of most economical section, having the form of a half hexagon with horizontal bottom is required to give a maximum discharge of $20.2\text{m}^3/\text{s}$ of water. The slope of the channel bottom is 1 in 2500. Taking Chezy's constant 60, determine the dimensions of the cross-section.

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SECTION-B

2. What do you mean by NC? Explain in detail DNC, CNC and Distributed NC.
3. Describe FMS Components with neat diagrams.
4. Explain Part & Assembly modeling, Manufacturing Simulation & Kinematic analysis as functions of Graphics Package.
5. What are the recent advancements in FEM? Write principles of FEA software.
6. Explain in detail Machinability and data selection system in CAPP.

SECTION-C

7. List down the benefits of FMS. What are the different types of data associated with FMS? Discuss the relevance of FMS from the point of view of work centre utilization.
8. (a) What is meant by canned cycles in CNC?
(b) Compare the splines for the same control points created by B-spline and Bezier techniques.
9. (a) What is rendering? What are the different stages of rendering an image?
(b) Describe each Transformation with a 3-D example :
 - i) Translation
 - ii) Reflection
 - iii) Scaling
 - iv) Rotation

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards) (Sem.-5)

MATHEMATICS-III

Subject Code : BTAM-500

M.Code : 70601

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Write briefly :

a) Expand $f(z) = \frac{z}{(z+1)(z+2)}$ about $z = -2$.

b) Evaluate $\int_C \frac{\sin z}{z \cos z} dz$ along the circle $C : |z| = 2$.

c) Find the bilinear transformation that map the points $z = 1, -i - 1$ into the points $w = i, 0, -i$.

d) Find $L(t^2 \sin 3t)$.

e) Form a partial differential equation from $z = f(x + 4t) + g(x - 4t)$.

f) Find the solution of homogeneous partial differential equation $2r - 5s + 2t = 0$.

g) Write Dirichlet's conditions for the expansion of $f(x)$ as a Fourier series in the interval $(-\pi, \pi)$.

h) Show that $P_n(-x) = (-1)^n P_n(x)$.

i) State Cauchy's Residue theorem.

j) Find the coefficient a_0 in the Fourier series of $f(x) = |x|, -\pi < x < \pi$.

SECTION-B

2. Prove that $\int J_3(x) dx = -J_2(x) - \frac{2}{x} J_2(x)$.
3. Expand $f(x) = x \sin x$, $-\pi < x < \pi$ as a Fourier series.
4. State convolution theorem and hence evaluate $L^{-1} \left[\frac{s^2}{(s^2+4)(s^2+9)} \right]$.
5. If $f(z) = u + iv$ is an analytic function, then find $f(z)$ if $u + v = \frac{x}{x^2 + y^2}$.
6. Solve the following partial differential equation by method of separation of variables :

$$4 \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u, \text{ Given that } u = 3e^{-y} - e^{-5y} \text{ when } x = 0$$

SECTION-C

7. Use the concept of residues to evaluate $\int_0^\pi \frac{d\theta}{(a+b \cos \theta)}$, where $a > |b|$.
8. A tightly stretched string has its ends fixed at $x = 0$ and $x = 1$. At time $t = 0$, the string is given a shape defined by $f(x) = \lambda x(1-x)$, where λ is constant and then released. Find the displacement of any point x of the string at any time $t > 0$.
9. Solve in series the equation :

$$(1+x^2)y'' + xy' - y = 0$$

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SECTION-B

2. What are strain gauges? Explain their working and applications.
3. *“Explain construction and working of vibration reed tachometer. Is this a precise instrument”?* Comment.
4. Explain any two methods to measure velocity.
5. How errors are identified and handled in test data?
6. Explain any two types of accelerometers.

SECTION-C

7. Describe the principle of operation of piezoelectric transducers. Identify the input and output of the system. Explain why it is desirable that piezoelectric transducers should be used for the measurement of dynamic quantities only.
8. Discuss construction and working of various gauges to measure low pressure.
9. Explain various methods to measure torque.

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SECTION-B

2.
 - a. Discuss the BIS method of designation of steels.
 - b. Explain the phenomenon of 'stress concentration'.
3. A 50 mm diameter shaft is welded to a flat plate by fillet weld. Determine the size of the weld if the shaft is required to transmit a torque of 1300 Nm. The permissible working shear strength of the weld material is 60 N/mm^2 .
4.
 - a. What is the function of couplings and clutches? How does a coupling differ from a clutch?
 - b. Explain the procedure of designing a fulcrum pin.
5. A spherical pressure vessel with a 500 mm inner diameter is welded from steel plates of cold drawn C20 steel of ultimate strength 440 N/mm^2 . The vessel is subjected to internal pressure which varies from 2 N/mm^2 to 6 N/mm^2 . If the reliability of the vessel is 95 % and the required factor of safety is 3, design the vessel for infinite life period.
6. Two plates of 6 mm thickness are to be joined by a double -riveted zig-zag lap joint, if the allowable strength of mild steel are $\sigma_t = 100 \text{ N/mm}^2$, $\tau = 70 \text{ N/mm}^2$, $\tau_{cr} = 130 \text{ N/mm}^2$.
7. Draw the fatigue curve and discuss its importance in the design of a machine element.

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SECTION-B

2. a. What is meant by conda effect?
b. Sketch any fluidic device and explain its operation. State its applications.
3. Draw the cross section of any position control spool valve and poppet valve. Also explain their working.
4. What are programmable logic controllers? Discuss the applications for which these are used. Discuss three significant advantages and disadvantages.
5. How is robotic vision sensed? What are the component systems used in most common vision based applications?
6. Discuss the socio economic impacts of automation.

SECTION-C

7. Discuss step wise procedure for design of pneumatic logic circuit for given sequence of operation. Illustrate the procedure by taking any simple example.
8. a. Explain a fluidic NOR gate using a neat sketch.
b. Classify robots based on their geometry. Explain in detail the industrial applications of robots.
9. Discuss VAL programming of robot for trajectory control operation.

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SECTION-B

Derive three dimensional heat conduction equations in cylindrical coordinates considering internal heat generation.

Derive relation for heat exchange between two infinitely long nonblack planes.

Find functional relationship for pressure drop of fluid passing through a tube of diameter D with velocity V . The density and dynamic viscosity of fluid are ρ and μ respectively.

What are the different regimes of boiling?

Derive the relation for average value of temperature difference between the fluids of a heat exchanger.

SECTION-C

Derive the relation of temperature distribution and heat transfer for rectangular fin of infinite length.

8. The temperatures on the inner and outer sides of a furnace wall are 650°C and 250°C respectively. It is exposed to ambient air at 50°C . To reduce the heat loss from the furnace, its wall thickness is increased to double. Determine the %age decrease in heat loss due to change in wall thickness assuming no change in surface and ambient temperatures.

9. Calculate radiation heat transfer in :

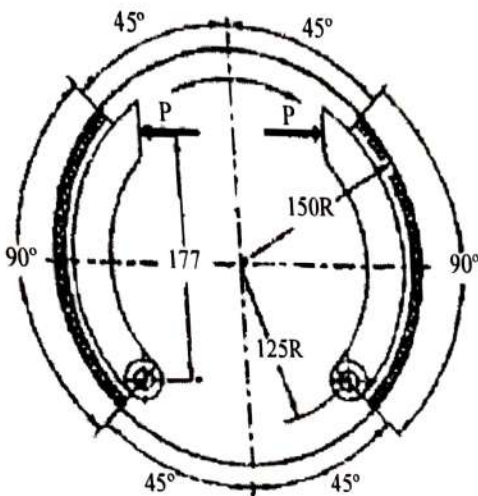
a. Two discs of diameter 50cm placed parallel to each other concentrically at a distance of 1m. The disc temperatures are 720°C and 220°C respectively, when no other surface present except the discs.

b. A 5cm sphere at 600°C placed near an infinite wall at 100°C .

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SECTION-B

An automotive internal expanding brake is shown in figure. The face width of the friction lining is 40 mm and the coefficient of friction is 0.35. The maximum intensity of normal pressure on the lining is limited to 0.8 N/mm^2 . Calculate the actuating force P . If the drum rotates in clockwise direction then determine the torque acting on the right-hand shoe due to the braking action.



- Q3. A helical compression spring is subjected to a force of 1 kN . The deflection of the spring corresponding to this force is approximately 30 mm . The spring is made of cold-drawn steel wire with ultimate tensile strength of 1000 N/mm^2 . The permissible shear stress for the spring wire is 500 N/mm^2 . The spring has square and ground ends. A gap of 1 mm between adjacent coils under maximum load condition is required to be maintained. Design the spring. Assume, spring index = 6 and $G = 8.14 \text{ kN/mm}^2$.
- Q4. Based on manufacturer's catalogue design a V-belt drive to connect a 20 kW , 1440 rpm induction motor to a fan running at approximately 480 rpm , for a service of 24 hr per day. From the space considerations, the centre distance should be maintained approximately at 1.2 m .
- Q5. A pair of spur gears consists of 24 and 48 teeth. The pinion rotates at 1000 rpm and has the module of 6 mm . The face width can be selected proportionately. Both gears are made of steel with an ultimate tensile strength of 500 N/mm^2 . They are heat treated to a surface hardness of 270 BHN . Considering dynamic load based on preliminary design, calculate (i) beam strength and (ii) wear strength. Take service factor and the factor of safety as 1.5 and 2, respectively.

SECTION-B

2. Explain principle and working of MHD power generation.
3. Discuss various bio-mass conversion technologies.
4. Explain working of double basin tidal power plant.
5. Describe construction details and working of a thermionic generator.
6. Derive an equation to measure the performance of a flat plate collector.

SECTION-C

7. Explain different types of vertical axis wind turbines with the help of diagrams. Also state their advantages and disadvantages as compared to horizontal axis wind turbines.
8. Explain different types of sources of geothermal energy.
9. Explain construction and working of a bio-gas plant.

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SECTION-B

2. Describe the factors that should be considered in selecting the electrolyte in ECM.
3. Explain the working principle of Photochemical machining.
4. Explain the various methods used for preparing the masks for Chemical Machining.
5. Explain the disadvantages of relaxation circuit and show the alternative arrangement of pulse generator used in EDM.
6. Differentiate between Dual gas torch and Water-Injected torch in PAM.

SECTION-C

7. With suitable diagrams explain element of abrasive flow machining and write the applications and limitation of this process.
8. With suitable diagram explain the working principle of USM. Briefly explain the elements of the process.
9. Explain the electrolyte flow methods used in ECM giving their relative merits and applications.

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24/E

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards) (Sem.-6)

STATISTICAL AND NUMERICAL METHODS IN ENGINEERING

Subject Code : BTME-604

M.Code : 71188

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) An incomplete frequency distribution is given below :

Variable	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	30	f_1	65	f_2	25	18

Given that the total frequency is 229 and median is 46. Find the missing frequencies f_1, f_2 .

- b) The probability that a pen manufactured by a company will be defective is 0.1. If 12 such pens are manufactured, find the probability that at least two will be defective.
- c) Explain different types of errors.
- d) Discuss intermediate value property.
- e) Prove that if λ is an eigen value of an orthogonal matrix A, then $1/\lambda$ is also its eigen value.
- f) Write Newton's-backward interpolation formula.
- g) Explain sampling distributions of the means.
- h) Discuss predictor-corrector method.
- i) Write Euler-Mechlaurin's formula.
- j) Discuss ill-conditioned equations.

SECTION-B

2. One thousand articles from a factory are examined and found to be three percent defective. Fifteen hundred similar articles from a second factory are found to be only two percent defective. Can it reasonably be concluded that the product of the first factory is inferior to the second.
3. Use the Newton-Raphson procedure for finding $\sqrt[3]{N}$ where N is a real number. Use it to find $\sqrt[3]{18}$ correct to two decimal places, assuming 2.5 as the initial approximation.
4. Find an approximate value of $\int_0^1 \frac{dx}{1+x^2}$ by using :
 - a) Trapezoidal rule,
 - b) Simpson's 1/3 rule
 - c) Simpson's 3/8 rule.
5. Determine the number of terms required in the series for $\log(1+x)$ to evaluate $\log(1.2)$ correct to six decimal places.
6. Find the first and second order derivatives of the function $f(x)$ at the point $x=1.5$, if

x	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$	3.375	7.000	13.625	24.000	38.875	59.000

SECTION-C

7. Determine the largest eigen value and the corresponding eigen-vector of the matrix
$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$
8. Using modified Euler's method and Runge-Kutta method of order 4, find $y(0.2)$ for $\frac{dy}{dx} = x + y^2$ with $y(0) = 1$. (Take $h = 0.1$)
9. In an intelligence test administered to 1,000 students, the average score was 42 and the standard deviation was 24. Find :
 - a) The number of students exceeding a score of 50.
 - b) The number of students lying between 30 and 54.
 - c) The value of the score exceeded by the top 100 students.

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23/E

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards) (Sem.-6)
FLUID MACHINERY
Subject Code : BTME-603
M.Code : 71187

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a. What is Euler's equation for energy transfer in turbomachine?
- b. How Vane efficiency is calculated?
- c. Classify hydraulic turbines based on the direction of water flow through runner with example of turbine.
- d. Draw few commonly used draft tubes.
- e. What is difference between inward and outward radial flow reaction turbines?
- f. Define Mechanical Efficiency of turbine.
- g. Mention few systems which use intensifier as their basic element.
- h. Define Unit Speed of a turbine.
- i. What is the use of runner?
- j. Define Specific Speed of a pump.

SECTION-B

2. Derive an expression for force exerted by a jet of water on a fixed vertical plate in the direction of the plate.
3. A centrifugal pump with impeller diameter 20cm at outlet and width of outlet passage 2cm has swept back blades at 25° to the tangent to the periphery. Calculate the flow rate and power requirement while operating at 300rpm under the condition of optimum performance.
4. Define and explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine.
5. What are the factors, which influence the speed of a reciprocating pump?
6. What is cavitation? Deduce expression for Thomas cavitation number.

SECTION-C

7. A Pelton wheel develops 6000 kW shaft power at 200rpm when operating under a head of 225 m. Overall efficiency of turbine is 85%. Find its unit speed, unit discharge and unit power. If it is tested at a site having supply head 150m with maximum tachometer speed available at 200 rpm, then also determine speed, discharge and power of wheel under changed head.
8. Define the term degree of reaction and explain it in terms of slow medium and fast runner. Can a turbine attain 100% degree of reaction?
9. Write short notes on :
 - a. Fluid coupling
 - b. Hydraulic ram

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B.Tech
Sem

2019 ME

Roll No.

Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (ME) (2012 Onwards OE) (Sem.-7,8)

HUMAN RESOURCE MANAGEMENT

Subject Code : HU-251/252/DE/ME-1.3/2.5

M.Code : 54067

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Answer briefly :

- a) Meaning of HRM
- b) Define Job Satisfaction
- c) Potential Appraisal
- d) Define the term Employment Exchange.
- e) What is the concept of Quality of working life?
- f) Significance of employee welfare.
- g) On the job coaching.
- h) Define the concept of selection.
- i) Different career stages
- j) Non-monetary incentive

SECTION-B

2. What do you mean by promotion? Explain the basic features of a sound promotion policy.
3. What is Job description? How it is prepared?
4. Define Motivation. Discuss Maslow's need hierarchy theory of motivation.
5. Discuss the utility of job evaluation. State the steps in job evaluation.
6. Explain the role of various kinds of working environment which affect the health of workers.

SECTION-C

7. Discuss the object, scope and extent of the Employment Exchange (Compulsory Notification of Vacancies) Act, 1959.
8. "*Personnel Management is as basic management function pertaining to all levels and all types of management*", Discuss.
9. Explain the scope and significance of collective bargaining in industry.

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SECTION-B

What are the principles on which a vibrometer and an accelerometer are based? Explain with a neat sketch.

What is the Semi-Definite system? Derive an expression for determining the frequency of the system.

A machine runs at 5000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is at least 20% from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of the machine as 30 kg.

Determine the flexibility influence coefficient for the system as shown in fig. 1. Assume $E=2.1 \times 10^{11} \text{ N/m}^2$.

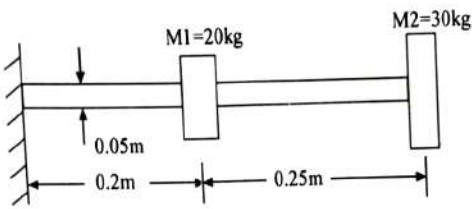


FIG.1

Q6. A bar of length L is fixed at one end and connected at the other end by a spring of stiffness ' K ' as shown in fig. 2. Derive suitable expression of motion for longitudinal vibration.

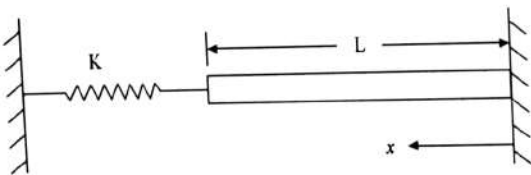


FIG.2

SECTION-C

Q7. Derive an expression for the response of single degree of freedom system with viscous damping when it is under damped.

- Q8. Write the limitations of dynamic vibration absorber. Prove that natural frequency of centrifugal pendulum absorber is always proportional to the speed of the rotating body.
- Q9. Use Stodola's method to determine the natural frequency of spring mass system as shown in fig. 3.

Assume $m_1 = m_2 = m_3 = m$ and $K_1 = K_2 = K_3 = K$

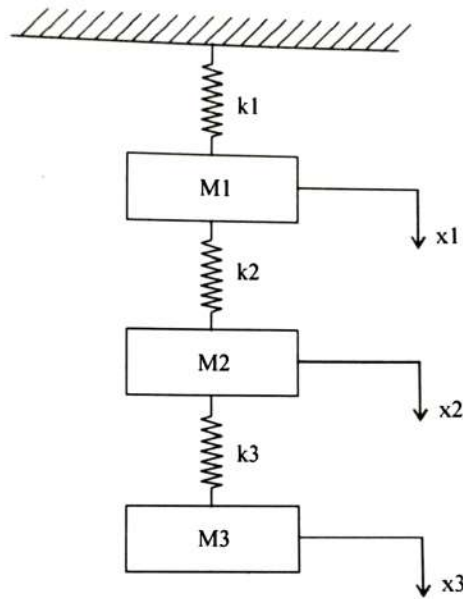


FIG.3

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SECTION-B

2. You recently rendered a performance report on one of your employees. The employee is not happy with the evaluation and has asked for an appointment to discuss the evaluation process. Discuss the following :
 - a) The purpose of the performance evaluation
 - b) The evaluation criteria
 - c) The employee's options regarding the evaluation
3. What is customer retention? Discuss in brief the procedure for handling customer complaints?
4. List the fourteen principles of Deming's approach
5. Write the basic principles of QFD. Differentiate between QFD for manufacture and service industries.
6. How will you define a quality circle? What are its composition and functions?

SECTION-C

7.
 - a) List the various tools that can be utilized for problem solving and situation analysis in the realm of TQM. Which of these tools are quantitative?
 - b) Efficiency has been defined as "Doing things better" and effectiveness as "Doing better things". Describe how benchmarking can be used to improve both efficiency and effectiveness.
8. Explain the following :
 - a) Origin of ISO 9000
 - b) Elements of ISO 9001
9. Define JIT. Explain in detail the basic steps for the implementation of JIT. Also discuss the equipment layout for JIT system.

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SECTION-B

2. *“NDT (Non Destructive Testing) has been growing, changing and expanding for nearly 100 years”*. Write a note on this statement.
3. Explain in brief rail inspection by Eddy current testing method.
4. Describe the advantages, disadvantages and applications of magnetic particle inspection.
5. Write a note on concept and applications of plane and circular polarization.
6. What is the principle of radiographic inspection? Explain the requirements of a good radiograph.

SECTION-C

7. (a) Explain how defects in plastics are detected.
(b) Explain the method to measure surface roughness by ultrasonic testing.
8. (a) Describe fluorescent penetration inspection.
(b) What is the role of penetrant in liquid penetrant inspection? Discuss the important properties of penetrants.
9. Write short notes on the following :
 - (a) Xeroradiography
 - (b) Effect of variables on radiographs

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Total No. of Pages : 02

of Questions : 09

B.Tech.(ME) (2012 Onwards E-II) (Sem.-7,8)

NON-TRADITIONAL MACHINING

Subject Code : DE/PE-2.0

M.Code : 72006

3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- (a) Distinguish between traditional and non-traditional machining processes.
- (b) What do you understand by computer integrated manufacturing?
- (c) Enumerate the applications of non-traditional machining processes.
- (d) Explain the material removal mechanism in water jet machining process.
- (e) Enumerate the advantages of chemical machining.
- (f) Enumerate the main functions of electrolytes used in ECM process.
- (g) Enumerate the process parameters used in USM process.
- (h) Enumerate the basic characteristics of electrode materials in EDM process.
- (i) Explain the working principle of electron beam machining process.
- (j) Enumerate the examples of hybrid machining processes.

SECTION-B

2. How non-traditional machining processes can be classified?
3. Explain the material removal mechanism in EDM process giving a neat sketch. Also explain the process parameters used in EDM process.
4. Describe the working and schematics of electrochemical deburring process with the help of a neat sketch.
5. Explain the construction and working of EDM machines with the help of a neat sketch. Also explain the criteria of selection of electrode material in EDM process.
6. Explain the working and construction of air-plasma machining process giving a neat sketch.

SECTION-C

7.
 - (a) Describe the material removal mechanism of abrasive flow machining process with the help of a neat sketch. Also explain the applications and limitations of AFM machine.
 - (b) Explain the steps involved in material removal in chemical machining process. Also explain the tooling for chemical machining.
8.
 - (a) Differentiate between sludging and non-sludging electrolytes used in electro chemical machining process. How flow of electrolyte is maintained in ECM process?
 - (b) Explain the working and construction of solid state laser machining process giving a neat sketch.
9.
 - (a) Describe the material removal mechanism of ultrasonic machining process with the help of a neat sketch.
 - (b) Explain the construction of electron beam gun and diffusion pump in electron beam machining process giving neat sketches.

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SECTION-B

2. Explain with diagram injection pump governor.
3. What is carburetor? And write down basic requirements from it.
4. Explain the difference between actual and fuel air cycle.
5. Explain valve timing diagram of four stroke petrol engine.
6. Explain methods used to determine minimum air quantity supplied to gases.

SECTION-C

7. Explain arrangement of supercharger and its installation.
8. Explain different types of fuel injection systems.
9. Explain all the devices used to meet the requirements of an ideal carburetor.

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4. The following data refers to a two stage compression with multiple expansion valves and flash inter-cooling :
- Condenser pressure : 9.634 Bar; Evaporator pressure : 1.828 Bar; Mass flow rate of refrigerant through evaporator: 0.2 kg/sec; intermediate pressure: 4.238 Bar; Refrigerant : R-12. Obtain the COP and capacity of the system and compare with a corresponding single-stage system operating between the above pressure limits.
5. 39.6 cm of a mixture of re-circulated room air & outdoor air enter a cooling coil at 31°C DBT & 18.5°C WBT. The effective surface temperature of the coil is 4.4°C. The surface area of the coil is such that it can produce 12.5 kW of refrigeration with the given entering air state. Determine the DBT & WBT of the air leaving the coil and the coil bypass factor.
6. Explain the working principle of Linde and Claude refrigeration system with the help of a neat sketch.

SECTION-C

7. a) An ammonia refrigeration machine has to produce refrigeration effect equal to the production of 20 tonnes of ice per day at -2°C from water at 9°C . If the system operates between the temperature limits of 27°C and -13°C . Calculate : Work input of compressor and actual COP if relative COP of system is 0.5
- b) A freon -22 refrigeration plant working between the temperature limits of 5°C & 40°C produces refrigeration capacity of 40 TR. What would be its capacity for food freezing for which the evaporator temperature is to be maintained at -35°C ?
8. a) The barometer for atmospheric air reads 750 mm Hg. The DBT 33°C and WBT is 23°C . Determine relative humidity, humidity ratio, dew point temperature.
- b) Describe the environmental impact of CFC, HCFC and HFC refrigerants.
9. a) A cascade refrigeration system is designed to 10 TR at an evaporator temperature of -60°C and a condenser temperature of 25°C . The load at -60°C is absorbed by a unit using R-22 as a refrigerant and is rejected to a cascade condenser at -20°C . A unit using R-12 as the refrigerant and operating between -30°C evaporator temperature and 25°C condenser temperature cools the cascade condenser. The refrigerant leaving the R-12 condenser is sub-cooled to 20°C . The vapors leaving the evaporators are dry saturated. Determine: compression ratio for each unit, quantity of refrigerant circulated per minute for each unit, COP for each unit, COP of whole system, theoretical power required to run the system.
- b) Explain the working of Ammonia water vapour absorption refrigeration system giving a neat sketch.

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SECTION-B

2. Discuss the job responsibilities of an Industrial engineer.
3. Explain fourteen principles of management proposed by Fayol.
4. Define Plant Layout. Discuss following types of plant layout :
 - a. Process layout
 - b. Group technology
 - c. Fixed position layout
5. What is Productivity? Give various ways to improve productivity and also Explain at least one way, with the help of suitable example.
6. Define Method Study and explain technique with its various steps?

SECTION-C

7.
 - a. Explain Frederick Herzberg's Two Factor Theory for improving motivation and performance of employees.
 - b. Describe the hierarchy, principles and dimensions of planning function.
8.
 - a. What is organization and its types? Explain salient features, advantages and applications of various types of organizations.
 - b. State the relationship between cumulative timing and fly back timing. How standard time is calculated?
9.
 - a. Briefly describe systems approach to management.
 - b. What are various types of values? Explain each one of them.

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B.Tech
Sem -

Dec 2019

B.Tech
ECE

Roll No.
Total No. of Que

Total No. of Pages : 02

B.Tech (ECE) (2018 Batch) (Sem.-3)
DIGITAL SYSTEM DESIGN
Subject Code : BTEC-302-18
M.Code : 76445

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What is the operational difference between SRAM and DRAM?
- b) How merged table be transformed into the excitation table?
- c) What are combinational circuits?
- d) Find the min-terms of the logic expression $Y = A'B'C' + A'B'C + A'BC + ABC'$.
- e) Draw the logic diagram of SR latch using NOR gate.
- f) What is single slope A/D converter?
- g) Write the names of different modelling of VHDL.
- h) Draw state diagram of 3-bit modulo 6 binary counter.
- i) Explain the concept of binary cell.
- j) State noise figure and figure of merit.

SECTION-B

2. List the predefined types for signal declaration in VHDL.
3. Explain Moore's and Melay sequential circuit.
4. Draw and explain the CPLD in detail.
5. Explain and provide the characteristics table, characteristic equation and excitation table for D-flip flop and J-K flip flop.
6. Describe the steps to design output Decoder along with the example.

SECTION-C

7. Realize the function $F(A,B,C,D) = \sum m(0,2,5,7,8,10,11,14)$ using PAL.
8. Describe cycles and races in asynchronous FSM along with the example.
9. Design full adder using structural modelling in VHDL.

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SECTION-B

2. Explain the effect of using negative feedback on various parameters of amplifiers.
3. Compare ion implantation process with diffusion.
4. What is a solar cell and how does it work?
5. What is e-k diagram and its significance?
6. What do you mean by annealing? Why it is required in IC fabrication process?

SECTION-C

7. Explain the construction and working of MOSFET.
8. What is the difference between a rectifier and regulator? Explain any one type of rectifier and regulator with diagram.
9. Describe all steps of Photolithography in detail with diagrams.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (2012 to 2017) (Sem.-3)
DIGITAL CIRCUITS AND LOGIC DESIGN

Subject Code : BTEC-302

M.Code : 57584

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) What is 1's and 2's complement.
- b) Give the significance of priority encoder.
- c) State and prove Demorgan's Theorem.
- d) Draw circuit of Full Adder with truth table.
- e) Differentiate between accuracy and resolution.
- f) What is limitation of J-K Flip-Flop?
- g) Convert $(1100)_{\text{Gray}}$ in to binary code.
- h) Differentiate between CMOS and TTL Logic family.
- i) Draw AND gate using NOR Gate.
- j) Fill in the Blank : $(65.85)_{10} = (?)_2$

SECTION-B

2. Write short notes on following :
 - a) MOD-N Counters
 - b) SOP form
3.
 - a) Use two 2-4 line decoders to make a 3-8 line decoder and explain its working.
 - b) Explain the working of T flip-flop and D flip-flop with their excitation tables
4. Discuss various types of Logic Gates. Also discuss their applications.
5. Mention the various types of ADC. Explain the successive approximation ADC in detail.
6. Explain different types of shift registers.

SECTION-C

7.
 - a) Design synchronous MOD-6 counter.
 - b) With neat circuit diagram , explain the function of 3-input TTL NAND gate
8. Design an even parity generator that generates an even parity bit for every input string of 5-bits.
9. Write a note on :
 - a) Content addressable memory
 - b) Binary ladder D/A converter

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

SECTION-B

- 2) Write and explain Maxwell's equation for static fields.
- 3) Explain the electromagnetic wave is transverse in nature.
- 4) Discuss about lossless and distortionless transmission lines.
- 5) A rectangular waveguide with dimensions $4\text{cm} \times 2\text{cm}$ operates at 10 GHz . Find f_c and λ_c of TE_{10} mode.
- 6) Write short note on wave impedance for free space.

SECTION-C

- 7) Write a short note on reflection of uniform plane wave.
- 8) Discuss reflection of electromagnetic wave from a perfect insulator incident obliquely.
- 9) What is understood by polarization of EM waves? Explain linear, elliptical and circular polarization with appropriate figures.

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SECTION-B

2. Find the current delivered to R_L using Thevenin theorem in Fig.1. Also verify your answer using Norton theorem.

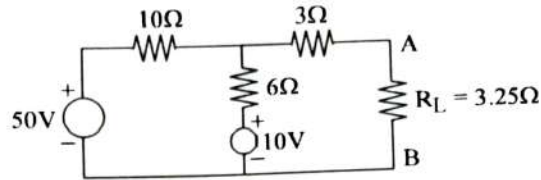


Fig.1

3. Find Y-parameters of the network of Fig. 2.

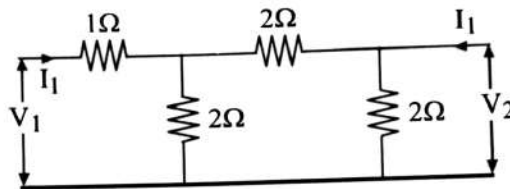


Fig.2

4. Steady state is achieved in the given circuit of Fig. 3. With switch, S open. Find the value of $I(t)$ for $t > 0$, if switch S is closed at $t = 0$.

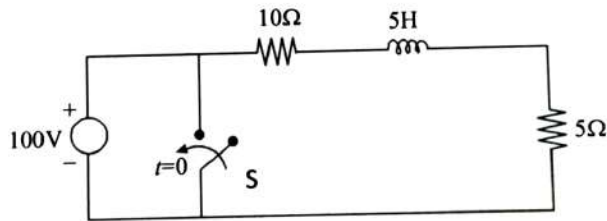


Fig.3

5. Using Mesh analysis, find I in the circuit of Fig. 4.

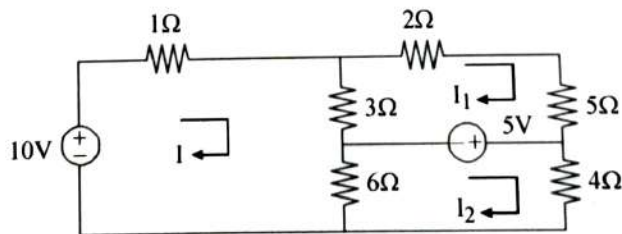


Fig.4

6. Classify filters and analyze any one type of filter in detail.

SECTION-C

7. Synthesize a network using foster-I and foster-II forms for the impedance function :

$$Z(s) = \frac{(s+1)(s+4)}{(s)(s+2)}$$

8. In the circuit shown in given Fig. 5, find the maximum power delivered to load R_L .

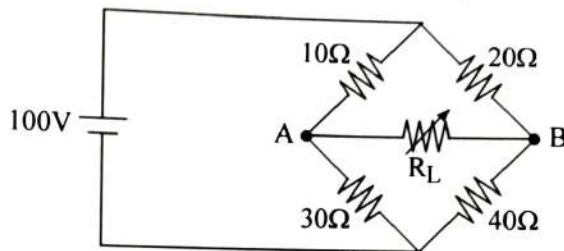


Fig.5

9. If a constant-K high pass filter has cut-off frequency of 10KHz and nominal impedance R_o is 700 Ω , design the T-and π -sections of this filter. Determine its characteristic impedance, phase constant at 25 KHz, and attenuation at 8KHz.

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Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ECE) (2018 Batch) (Sem.-3)

NETWORK THEORY

Subject Code : BTEC-304-18

M.Code : 76447

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Define maximum power transfer theorem and state the conditions for maximum power transfer for dc and ac circuits.
- b) State convolution theorem.
- c) Define Transmission Parameters.
- d) A series RL circuit has $R=10K\Omega$, $L=10mH$ and $C=1 \mu F$. Find the Transfer function of the circuit.
- e) Define the necessary and sufficient conditions for a polynomial to be Hurwitz.
- f) Define: transfer function, pole, zero.
- g) Define : image impedance and Quality Factor.
- h) Give the properties of LC circuit.
- i) State the advantages of 3-phase supply over single phase.
- j) Find the Laplace Transform of
 - i) $e^{-5t} \cos 2t$
 - ii) te^{-2t}

SECTION-B

2. For the given two port network calculate the Impedance parameters.

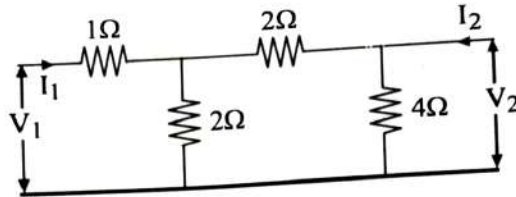


FIG.1

3. Find whether the given function is a positive real function?

$$F(s) = \frac{s^2 + 50s + 14}{s + 12}$$

4. Determine the exponential form of Fourier series expansion for periodic wave shown in Fig.2.

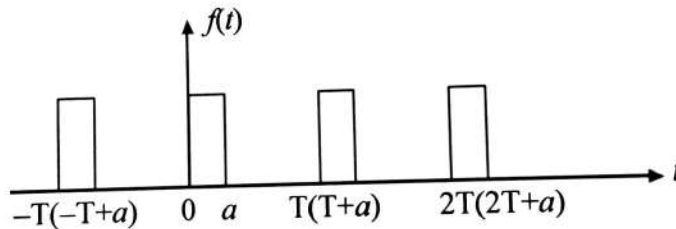


FIG.2

5. In the circuit shown, steady state is reached with switch open. Switch is closed at $t=0$. Determine $i(t)$ and $v(t)$ for $t > 0$. Fig. 3

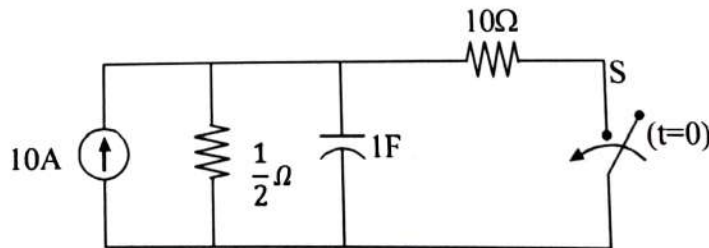


FIG.3

6. What are different types of filter? Explain Butterworth Filter.

SECTION-C

7. The driving point impedance is given by :

$$z(s) = \frac{(s+1) + (s+4)}{(s)(s+2)}$$

Obtain the Foster-I and Foster-II forms.

8. An unbalanced three-wire, star connected load has a voltage of 400V, the loads are : $(4+j8)$, $(3+j4)$ and $(15+j20)\Omega$. Determine line currents and voltage across each phase impedance.
9. Find current I in the 5Ω resistor using Thevenin theorem and verify the result using Norton theorem Fig. 4.

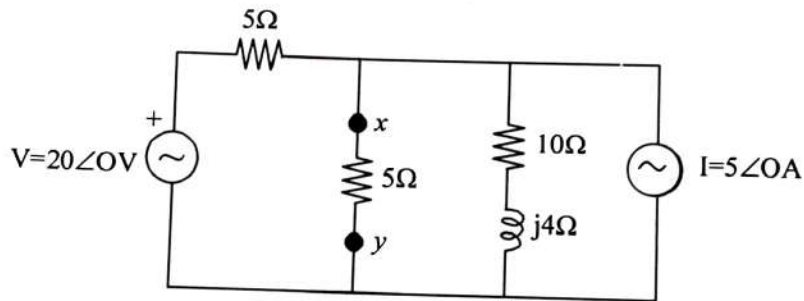


FIG.4

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Roll No.

Total No. of Pages : 02

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B.Tech. (ECE) (2012 to 2017) (Sem.-3)

ANALOG DEVICES & CIRCUITS

Subject Code : BTEC-301

M.Code : 57583

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Why is zener diode used as voltage regulator?
- b) Give two advantages and disadvantages of FET over BJT.
- c) What do you understand by terms channel and drain in JFET?
- d) Why is it necessary to stabilize the operating point of a transistor amplifier?
- e) Give reasons why common emitter (CE) configuration is widely used in amplifier circuits.
- f) What is reverse saturation current?
- g) What is tunnelling?
- h) Why is negative feedback employed in high gain amplifiers?
- i) List the two Barkhausen conditions required for sinusoidal oscillations to be sustained.
- j) What is crossover distortion? How can it be minimized?

SECTION-B

2. What is P-N junction diode? How potential barrier is formed in a P-N junction diode?
3. Compare the characteristics of transistor amplifiers in the three possible configurations.
4. A class B push-pull amplifier must deliver 10 W of audio power to the output load :
 - a) If the output transformer is 80% efficient, what is the minimum power drain on the power supply under optimum conditions and
 - b) What is the minimum average power dissipation rating required for each transistor?
5. Discuss the effects of negative feedback on gain, stability, and bandwidth.
6. Draw the hybrid model of a BJT and explain each component.

SECTION-C

7. a) In a CE configuration, the collector supply voltage is 10 V. When a resistor $RC = 1 \text{ k}\Omega$ is connected in the collector circuit, the voltage drop across it is 0.5 V. For $\alpha = 0.98$, determine the collector-emitter voltage and the base current.
 - b) Explain the operation of a tunnel diode. Draw its V-I characteristics and list the possible applications of the device.
8. Draw the circuit diagram of a Colpitt's oscillator using transistor and explain its working principle. Also derive an expression for its frequency of oscillations.
9. a) The h parameters for a CE amplifier

are $h_{ie} = 2600\Omega$, $h_{fe} = 100$, $h_{re} = 0.02 \times 10^{-2}$ and $h_{oe} = 5 \times 10^{-6}$. Find h parameters for CC configuration.

 - b) What is the significance of stability factor in transistor operation?

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16/E

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ECE) (2018 Batch) (Sem.-3)

MATHEMATICS III

Subject Code : BTAM-303-18

M.Code : 76448

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) In Poisson frequency distribution, frequency corresponding to 3 successes is $\frac{2}{3}$ times frequency corresponding to 4 successes. Find the standard deviation of the distribution.
- b) Find the Z-transform of $e^t \sin 2t$
- c) Find the Laplace transform of $t^2 \sin t$
- d) Define Binomial and Poisson distribution functions.
- e) Define Rank correlation.
- f) Define the Laplace and Fourier transforms.
- g) Define unit-step and dirac delta functions.
- h) Define discrete and continuous random variables.
- i) State convolution theorem of Fourier transform.
- j) Given that $f(x) = k \left(\frac{1}{2}\right)^x$, is a probability distribution for a random variable which can take on its values $x = 0, 1, 2, 3, 4, 5, 6$. Find k .

SECTION-B

Use Laplace transform method to solve

$$\frac{d^2x}{dt^2} - \frac{2dx}{dt} + x = e^t$$

with $x = 2$, $\frac{dx}{dt} = -1$ at $t = 0$.

Find the Fourier sine transform of $e^{-|x|}$. Hence show that :

$$\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}, \quad m > 0$$

If

$$U(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$$

Evaluate u_2 and u_3 .

The theory predicts the proportion of beans, in the four groups A, B, C and D should be 9:3:3:1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory? (The table value of χ^2 for 3 d.f. at 5% level of significance is 7.81).

The two regression equations of the variables x and y are $x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$. Find

(i) mean of x and y

(ii) the correlation co-efficient between x and y .

SECTION-C

Find the Fourier cosine series of the function $f(x) = \pi - x$ in $0 < x < \pi$. Hence show that

$$\sum_{r=0}^{\infty} \frac{1}{(2r+1)^2} = \frac{\pi^2}{8}$$

8. a) Marks obtained by a number of students are assumed to be normal distributed with mean 50 and variance 36. If 4 students are taken at random, what is the probability that exactly two of them will have marks over 65?
Given that $\int_0^2 \Phi(z) dz = 0.4772$ where Z is $N(0, 1)$.

- b) Fit the second degree parabola to the following data :

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

9. From the given data, find (i) the two regression equations, (ii) the coefficient of correlation between the marks in Mathematics & Statistics, and (iii) the most likely marks in Statistics when the marks in Mathematics are 30.

Marks in Mathematics	25	38	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

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Roll No.

Total No. of Pages : 02

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B.Tech.(ECE/Electronics Engg)/
(Electronics & Computer Engg) (2012 to 2017) (Sem.-3)

ANALOG DEVICES & CIRCUITS

Subject Code : BTEC-301

M.Code : 57583

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Any missing data can be assumed appropriately.

SECTION-A

Write briefly :

- Q1. State the Barkhausen criteria for oscillator.
- Q2. Why negative feedback employed in high gain amplifiers?
- Q3. Draw the hybrid model of CE, CB and CC BJT's.
- Q4. What is thermal run-away?
- Q5. Compare Zener breakdown and Avalanche break down.
- Q6. Define Reverse Leakage Current of Diode.
- Q7. Calculate I_c and I_E for a transistor that has $\alpha_{dc} = 0.99$ and $I_B = 150\mu A$. Determine the value of β_{dc} for the transistor.
- Q8. Why it is required to have a stable Q-point of an amplifier?
- Q9. What is the value of Ripple factor for half wave and full wave rectifier?
- Q10. What is the Miller Effect?

SECTION-B

- Q11. Explain briefly the working of Hartley oscillator.
- Q12. In a Class C amplifier with 1MHz signal frequency, determine the suitable tank circuit component values. Calculate the max AC power delivered to the load if $V_{CEmax} = 0.5V$, $V_{cc} = 30V$, $R_L = 1.2k\Omega$.
- Q13. Derive an expression for the overall gain of voltage series feedback amplifier.
- Q14. Explain construction, operation and characteristics of JFETs.
- Q15. Draw and explain the complementary symmetry amplifier and discuss its advantages.

SECTION-C

- Q16. Define H-Parameters. Derive expression for following of CE amplifiers using h-parameters
- Voltage gain
 - Current Gain
 - Input Resistance
 - Output Resistance
- Q17. Draw and explain the working of R-C phase shift oscillator and also derive an expression for its frequency of oscillations.
- Q18. Explain working of push pull amplifier.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE)/(Electronics Engg)/
(Electronics & Computer Engg) (2012 to 2017) (Sem.-3)

DIGITAL CIRCUITS AND LOGIC DESIGN

Subject Code : BTEC-302

M.Code : 57584

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Perform the subtraction $10111_2 - 11111_2$ using 1's complement method of subtraction.
- b) Convert the decimal number 359_{10} to BCD.
- c) Give the difference between SOP and POS forms.
- d) Draw symbol and construct the truth table for three input Ex-OR gate.
- e) Why totem pole outputs cannot be connected together.
- f) How multiplexer differs from decoder?
- g) What is the basic difference between buffered and unbuffered CMOS devices?
- h) What is totem-pole output stage? What are its advantages?
- i) Which is the fastest ADC and why?
- j) How many address bits are required for a 512×4 memory?

SECTION-B

2. Using the Boolean algebra, simplify the expression :

$$\overline{A}BC + \overline{(A+B+C)} + \overline{A}B\overline{C}D$$

3. What is meant by Decoder? Explain 3-to-8 line decoder with diagram and truth table.
4. Design a counter with the following binary sequence: 0, 4, 2, 1, 6 and repeat. Use JK flip-flops.
5. Explain the working of a basic totem-pole TTL 2 input NAND gate.
6. Realize $F(w, x, y, z) = \Sigma(1, 4, 6, 7, 8, 9, 10, 11, 15)$ using 8 to 1 Mux

SECTION-C

7. Find a minimal SOP representation for $f(A, B, C, D, E) = \Sigma m(1, 4, 6, 10, 20, 22, 24, 26) + d(0, 11, 16, 27)$ using K-map method. Draw the circuit of the minimal expression using only NAND gates.
8. a) Implement the following function using PLA $F1 = \Sigma(0, 1, 2, 4)$ and $F2 = \Sigma(0, 5, 6, 7)$.
- b) Describe with the help of a schematic diagram the principle of operation of a successive type A/D converter.
9. Write short notes on **any two** :
- a) Weighted register D/A converter
- b) Edge triggered JK flip-flop
- c) CMOS logic family

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Roll No.

Total No. of Pages : 02

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B.Tech.(ECE) (2018 Batch) (Sem.-3)

DIGITAL SYSTEM DESIGN

Subject Code : BTEC-302-18

M.Code : 76445

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What is the operational difference between SRAM and DRAM?
- b) How merged table be transformed into the excitation table?
- c) What are combinational circuits?
- d) Find the min-terms of the logic expression $Y = A'B'C' + A'B'C + A'BC + ABC$.
- e) Draw the logic diagram of SR latch using NOR gate.
- f) What is single slope A/D converter?
- g) Write the names of different modelling of VHDL.
- h) Draw state diagram of 3-bit modulo 6 binary counter.
- i) Explain the concept of binary cell.
- j) State noise figure and figure of merit.

SECTION-B

2. List the predefined types for signal declaration in VHDL.
3. Explain Moore's and Melay sequential circuit.
4. Draw and explain the CPLD in detail.
5. Explain and provide the characteristics table, characteristic equation and excitation table for D-flip flop and J-K flip flop.
6. Describe the steps to design output Decoder along with the example.

SECTION-C

7. Realize the function $F(A,B,C,D) = \sum m(0,2,5,7,8,10,11,14)$ using PAL.
8. Describe cycles and races in asynchronous FSM along with the example.
9. Design full adder using structural modelling in VHDL.

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Roll No.

Total No. of Pages : 02

Total No. of Questions

B.Tech.(ECE) (2012 to 2017) / (ETE) (Sem.-4)

PULSE WAVE SHAPING AND SWITCHING

Subject Code : BTEC-405

M.Code : 57597

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Any missing data can be assumed appropriately.

SECTION-A

Q1. Answer briefly :

- a) Draw the input and output waveforms when sine wave is given to the pure inductor.
- b) What is the difference between average value and peak value?
- c) Define the role of positive feedback in electronic circuits.
- d) What do you mean by bistable multivibrator?
- e) Define UTP in Schmitt trigger.
- f) Only write the expression for gate width in monostable multivibrator.
- g) Define the cut in voltage in silicon diode.
- h) Draw the output response if square wave is applied to the RC high pass circuit.
- i) Only draw a circuit that sliced off the negative cycle.
- j) List the applications of operational amplifier comparator.

SECTION-B

- Q2. Define Delay time, rise & fall time and storage time with waveform in transistor switching.
- Q3. Differentiate between linear and non-linear wave-shaping circuits.
- Q4. For a common emitter circuit, $V_{CC} = 18\text{ V}$, $R_C = 4\text{ k}\Omega$ and $I_B = 0.5\text{ mA}$.
- Determine the value of h_{fe} (min) for saturation to occur.
 - If R_C is changed to $1.5\text{ k}\Omega$, will the transistor be saturated?
- Q5. Explain how a high pass RC circuit works as a differentiator.
- Q6. Explain the working of attenuator.

SECTION-C

- Q7. The fixed-bias bistable multivibrator uses NPN transistors with $h_{fe} = 25$. The circuit parameters are $V_{CC} = 20\text{ V}$, $V_{BB} = 3\text{ V}$, $R_C = 2\text{ k}\Omega$, $R_1 = 7\text{ k}\Omega$, $R_2 = 10\text{ k}\Omega$, $V_{CE(\text{sat})} = 0.5\text{ V}$, and $V_{BE(\text{sat})} = 0.8\text{ V}$. Find the stable state voltages and currents.
- Q8. With the help of circuit diagrams, expressions and waveforms explain the working of monostable multivibrator.
- Q9. Explain any two with necessary diagrams ;
- Schottky diode
 - Emitter coupled monostable multivibrator.
 - Positive and negative clipper.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (2012 to 2017)/(Electronics & Telecomm. Engg.)
(Sem.-4)

ANALOG COMMUNICATION SYSTEMS

Subject Code : BTEC-401

M.Code : 57593

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Discuss the in analog communication system with neat diagram.
- b) Define noise and noise factor.
- c) Discuss tracking and alignment in AM reception.
- d) Discuss the AM receiver using phase locked loop.
- e) What do you mean by balanced modulator?
- f) What is selectivity in AM reception?
- g) Define modulation and demodulation.
- h) Discuss square law modulation.
- i) What do you mean by SSB system?
- j) Discuss the concept of pulse position modulation.

SECTION-B

2. Explain how the phase modulation obtained from the frequency modulation.
3. Give a fair Comparison between AM and FM.
4. Write a short note on receiver parameters.
5. Discuss the frequency modulator with diagram.
6. Explain the AM receiver characteristics.

SECTION-C

7. Discuss the generation of SSB transition with their three different methods.
8. Write a note on multiplicative mixer using dual gate MOSFET with diagram.
9. Discuss the different element of communication system with block diagram.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (2012 to 2017)/(Electronics & Telecom Engg.)
(Sem.-4)

ELECTROMAGNETICS AND ANTENNAS

Subject Code : BTEC-403

M.Code : 57595

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1) Answer briefly :

- a. What is the intrinsic impedance of free space?
- b. Differentiate between TE and TM mode.
- c. Define Directive Gain and directivity with respective antenna. An antenna has a directivity of 20 and radiation efficiency of 90%. Compute the gain in dBs.
- d. Define Surface Impedance.
- e. What is distortionless condition?
- f. Define Array Factor.
- g. What are scanning arrays?
- h. Define Critical Frequency.
- i. What is the equation of continuity for steady currents?
- j. Define Far Field.

SECTION-B

- 2) Explain ground wave and space wave propagation.
- 3) State and prove Poynting Vector Theorem. Also explain the significance of each term.
- 4) Discuss the use of low loss RF and UHF transmission lines.
- 5) Explain Babinet's principle in detail.
- 6) Derive an expression for the current distribution of half wave dipole.

SECTION-C

- 7) Describe the salient features of horn antenna. Why it is called Super gain antenna? Explain its construction and working in brief.
- 8) Show that a 2GHz signal cannot propagate in the TM₁ mode in a parallel conducting plates having a plate separation of 5 cm.
- 9) What are the different types of antenna parameters? Explain any four in brief.

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SECTION-B

- Q2) Discuss R-2R ladder type DAC.
- Q3) Explain in detail about ADC and DAC converters.
- Q4) Describe the principle of working and circuit diagram of a digital oscilloscope.
- Q5) Derive the bridge balance condition for the Maxwell Bridge and Schering Bridge.
- Q6) Derive the torque equation of electro-dynamometer type instrument.

SECTION-C

- Q7) What is telemetry system and explain its types in detail.
- Q8) Explain the construction and principle of working of a LVDT.
- Q9) Two watt meters are connected to measure the input to a balanced 3phase circuit indicate 2000 W and 500 W respectively. Find the power factor of the Circuit (1) when both the readings are positive (2) when the latter reading is obtained after reversing the connection to the current coil of first instrument.

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SECTION-B

2. Explain the following :
 - a. Linear and non-linear systems
 - b. Time-variant and time-invariant systems
3. Find the transfer function of the block diagram having two inputs ($X_1(s)$ and $X_2(s)$) and one output $Y(s)$.

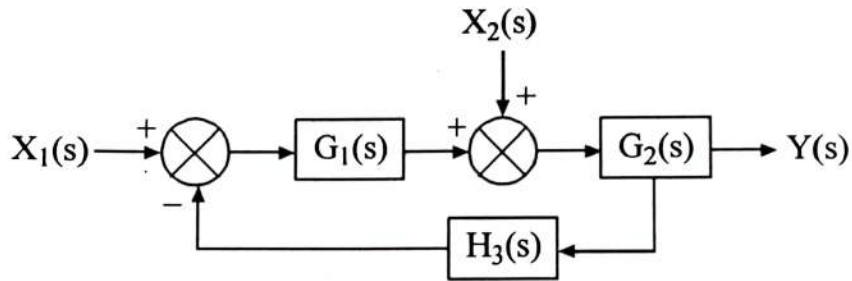


Fig.1

4. The characteristic equation of a feedback control system is given by

$$s^4 + 20s^3 + 15s^2 + 2s + K = 0$$

Determine the range of values of K for the system to be stable. Can the system be marginally stable? If so, find the values of K and frequency of sustained oscillation.

5. The open loop transfer function of a system is given by $G(s)H(s) = \frac{K}{s(2s+1)}$. Determine the stability of the system using Nyquist Criterion.
6. Find the open loop transfer function with proper explanation from the Bode Plot shown below :

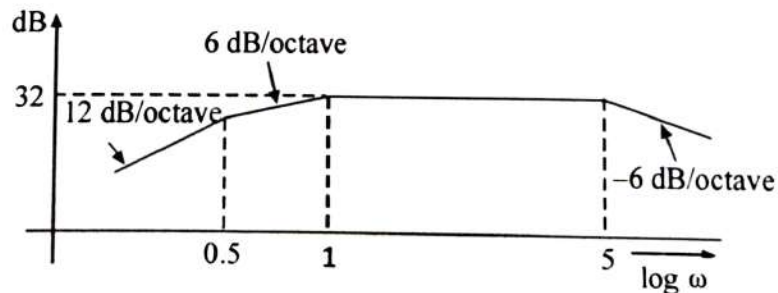


Fig.2

SECTION-C

7. A unity feedback system has an open loop transfer function $G(s)H(s) = \frac{K}{s^2(s+2)}$. By sketching the root locus plot, show that the system is unstable for all values of K.
8. Discuss the dynamic response of the first order system when :
- Step input is applied
 - Sinusoidal input is applied
9. Discuss the following :
- Lag compensation
 - Magnetic Amplifier

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017) (Sem.-4)

SIGNAL AND SYSTEMS

Subject Code : BTEC-402

M.Code : 57594

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Differentiate Energy and power signals.
- b) Explain joint and conditional probability with example.
- c) What is power spectral density?
- d) Discuss the spectrum of continuous time signals.
- e) Define sampling theorem.
- f) What is meant by difference equation?
- g) Explain Ergodic process.
- h) What is central limit theorem?
- i) What is LTI system? Explain with the help of example.
- j) Discuss random processes.

SECTION-B

2. Define Signal. Discuss the classification of signals with suitable example.
3. Determine the Fourier Transform of the unit step function $u(t)$.
4. Discuss the convolution integral representation of LTI system.
5. Discuss the properties of Fourier transform and prove at least four of them.
6. Derive a relationship for transmission of random processes through linear system.

SECTION-C

7. What is DTFT? Discuss various properties of DTFT.
8. a) Calculate the Z- transform of: $x(n) = d^n u(-n-1)$
b) Find the system function $H(z)$ and unit sample response $h(n)$ of the system whose difference equation can be described by $y(n) = \frac{1}{2y(n-1)} + 2x(n)$, where $y(n)$ and $x(n)$ are the output and input of system.
9. Explain in detail the representation of a signal using complex exponential Fourier series.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017)

B.Tech.(Automation & Robotics) (2012 & Onwards)
(Sem.-5)

MICROPROCESSORS & MICROCONTROLLERS

Subject Code : BTEC-504

M.Code : 70480

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- (a) Give any two differences between microprocessor and microcontroller.
- (b) Name three features of 8051 microcontroller.
- (c) Write the working of one of the register used in Execution unit of 8085.
- (d) Write the instruction format of the ADDITION and SUBTRACTION instruction in 8085 microprocessor.
- (e) Discuss the working of stack and subroutine in 8085 programming.
- (f) What components are normally put together with the microcontroller in a single chip?
- (g) Explain the structure of PSW in microcontroller.
- (h) Explain timer mode 1 and mode 2.
- (i) What are assembler directives of 8051 microcontroller?
- (j) What is stepper motor?

SECTION-B

2. Explain Bus organization of 8085 in detail.
3. Discuss the pin configuration of 8051 microcontroller.
4. What are the different types of instruction formats of 8085 microprocessor? Give example of each format.
5. Draw and explain Timers/COUNTERS pulse control circuitry.
6. With the help of diagram explain how 8051 interfaced to external memory.

SECTION-C

7. What are the Different Addressing modes of 8051 microcontroller? Explain each with suitable examples.
8. What is difference between timer and counter of 8051 microcontroller? How to start/stop the counter of 8051 when GATE control is not used?
9. Explain Jump and Logical instructions in 8051 microcontroller with suitable examples.

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SECTION-B

2. Compare Digital and Analog communication system.
3. What is the purpose of Clock recovery circuit? When it is used?
4. Explain the coherent and non-coherent FSK detectors.
5. Determine the signal to quantization noise ratio of a delta modulate with a bit rate of 64 kb/s and an input signal bandwidth of 4KHz.
6. How the use of eye patterns are useful for studying the ISI in digital communication system?

SECTION-C

7. Explain the Quadrature phase Shift Keying way of digital modulation in detail. Derive all the mathematic equations to support your answer.
8. A Gaussian channel is having a band width of 1MHz. Calculate the channel capacity if the signal power to noise spectral density is 105 Hz. Also find the maximum information rate.
9. Explain the working of adaptive delta modulation with suitable diagrams. Also compare this with other modulation schemes.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE) (2012 to 2017) (Sem.-5)

DIGITAL SIGNAL PROCESSING

Subject Code : BTEC-502

M.Code : 70546

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Write briefly :

- a. Give the significance of ROC in Z-transform.
- b. Determine whether the signal is periodic or non periodic also determine its fundamental period $x(n) = 3\cos\left(5n + \frac{\pi}{6}\right)$
- c. Determine whether the system is linear or non-linear $y(n) = x(n^2)$.
- d. What do you mean 'twiddle factor' of DFT & show how it is cyclic?
- e. Explain the factors that influence the choice of specific structure for realization of a digital filter.
- f. Compare the computational efficiency of FFT algorithms over the direct computation of DFT.
- g. In the implementation of a digital system what are the effects of coefficient quantization?
- h. Differentiate between FIR and IIR filter.
- i. What are the desirable features of DSP processors?
- j. Give the various steps involved in the design of FIR filter?

SECTION-B

2. Determine the response $y(n)$, $n \geq 0$, of the system described by the second order difference equation :

$$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1) \text{ to the input } x(n) = 4^n u(n)$$

3. Determine and sketch the convolution $y(n)$ of the following signals :

$$x(n) = \begin{cases} (0.5)^n, & 0 \leq n \leq 4 \\ 0, & \text{elsewhere} \end{cases}$$

$$h(n) = \begin{cases} 1, & -1 \leq n \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

4. State and prove the differentiation property of Z-transform.

5. Determine the Z-transform of the signal :

$$x(n) = n^2 u(n)$$

6. Determine the causal signal $x(n)$ if its Z-transform $X(z)$ given by

$$X(z) = \frac{2 - 1.5z^{-1}}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

SECTION-C

7. a. Obtain the direct form-1, cascade & parallel structure for the following system

$$y(n] = \frac{1}{2}y[n-1] + \frac{1}{4}y[n-2] + x[n] + x[n-1]$$

- b. Draw the block diagram of ADSP 2181 processor. Explain the architectural features of this.

8. Compute the 8-point DFT of the sequence :

$$x(n) = \begin{cases} 1, & 0 \leq n \leq 2 \\ 2n, & 3 \leq n \leq 7 \\ 0 & \text{otherwise} \end{cases}$$

using the radix-2 decimation-in-time FFT algorithm.

9. Design the symmetric FIR low pass filter using hamming window, whose desired frequency response is given as,

$$H_d(\omega) = \begin{cases} e^{-j5\omega}, & -3\pi/4 \leq \omega \leq 3\pi/4 \\ 0, & 3\pi/4 \leq |\omega| \leq \pi \end{cases}$$

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SECTION-B

2. Draw the op-amp block diagram and explain the functions of each block.
3. Explain the concept of level translator.
4. Draw the functional block diagram of IC 555 in detail.
5. Explain the operation of Narrow band pass filter with a neat diagram.
6. Explain how the average circuit can be derived from the summer.

SECTION-C

7. Derive the Differential Amplifier- AC analysis of single input dual output Configuration in detail.
8. Draw the block diagram of Astable operations using IC 555 and derive its time constant.
9. Design and draw the circuit diagram of a second order low pass Butterworth filter having a high cut-off frequency of 1kHz. Use capacitor value $\leq 1\mu\text{F}$.

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SECTION-B

2. Sort the following elements :
415, 213, 700, 515, 712, 715 using quick sort algorithm.
3. Write a program for the following :
To split a linear linked list into two linear linked lists on the basis of data i.e, the even number are stored in the first list and odd numbers are stored in the second list.
4. List and explain the types of queues.
5. Explain depth first search traversal algorithm.
6. Create a min heap tree from the following sequence of elements when they are added one-by-one into the heap:
Elements : 42,28,48,20,58,75,51,17,32,45

SECTION-C

7. Write a program in C to convert infix expression into postfix expression. Also convert the following infix notation into postfix notation using stack :
 $A + B + (C/D - F \times G) \times E.$
8. Write a program for the following :
 - a. To find the sum of all elements in binary tree.
 - b. To find a given binary search tree is strictly binary tree or not.
9. Write a short note on the following :
 - a. Double hashing
 - b. Hashing
 - c. Rehashing
 - d. Separate chaining

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SECTION-B

2. How wavelength can be measured using microwave set up?
3. Explain working of Tunnel diode.
4. How Microwave Bridge works?
5. Explain the double minimum method for measurement of SWR.
6. A two cavity klystron amplifier has following characteristics

Voltage gain = 15 dB

Input power = 5 mW

R_{sh} of input cavity = 30 k Ω

R_{sh} of output cavity = 40 k Ω

R_L = 40 k Ω

Find : a) The input rms voltage b) output rms voltage

SECTION-C

7. Compare 2-cavity klystron and reflex klystron *w.r.t* their working and construction.
8. Explain working of E-plane Tee and H-plane Tee (with neat and clean diagram). Also solve s-matrix for the same.
9. Write note on :
 - a) CW Radar
 - b) MTI Radar

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SECTION-B

2. What is a scheduler? Explain the primary objectives of scheduling.
3. What are the various memory management techniques? Discuss with example.
4. Explain Dining Philosopher problem in process synchronization.
5. What is the primary goal of Authentication and how can you achieve that through the password mechanism?
6. Explain the different states of process. What is the purpose of process control block?

SECTION-C

7. What do you mean by page faults? When do page faults occur? Describe the action taken by Operating System when page fault occurs.
8. What is the need of file management? List different types of access methods available in files.
9. What is Operating System? Discuss various classification of operating system.

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SECTION-B

2. Write VHDL code for the full adder in structural modeling.
3. Define NMOS inverter. Draw and explain the transfer characteristics.
4. Illustrate the use of package declaration and package body with an example.
5. Write the VHDL code for D flip flop.
6. Write VHDL code for BCD to 7 segment decoder using CASE statement.

SECTION-C

7. Draw and explain MOS structure. Derive the MOS device design equation.
8. Differentiate between NMOS, PMOS and CMOS.
9. Write the VHDL code for 4:1 MUX using different type of architecture techniques.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (E-I 2012 to 2017)
(Sem.-6)

INFORMATION THEORY AND CODING

Subject Code : BTEC-907

M.Code : 71236

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Write a short note on: Kraft inequality
- b) Prove that the mutual information of a channel is symmetric.
- c) What is ARQ? State its types.
- d) Briefly explain Hamming Sphere.
- e) What do you mean by generator matrices of the cyclic codes?
- f) Write the steps for decoding of BCH codes.
- g) Write short note on decoding methods of convolutional codes.
- h) Write short note on Hamming distance and code efficiency.
- i) Explain in brief Go Back N ARQ system.
- j) What do you mean by matrix description of cyclic codes?

SECTION-B

2. Prove that the average information is maximum when the messages are equally likely.
3. Show how a 4bit stage shift register can generate a convolution code for input train 11001.
4. What is Nyquist criterion? Prove its sampling theorem mathematically. What is the need of antialiasing filter? How does it affect the distortion?
5. Maximum likelihood algorithm is used for decoding. Show its convergence and implementation in comparison to conventional technique by taking one example.
6. Discuss in detail convolution decoding procedure using the Trellis diagram.

SECTION-C

7. Write down short notes on :
 - a) RS codes
 - b) Golay codes
 - c) Shortened cyclic codes
 - d) Burst error correcting code
8. Design a block code with minimum distance of three and a message block size of 8bits.
9. Consider the random variable

$X=$	x_1	x_2	x_3	x_4	x_5	x_6	x_7
	0.49	0.26	0.12	0.04	0.04	0.03	0.02

- a) Find the binary Huffman code for X.
- b) Find the expected code length for the encoding
- c) Find a ternary Huffman code for X.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017) (Sem.-6)
ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT
Subject Code : BTEC-603
M.Code : 71123

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1. Answer briefly :

- a. Present worth method
- b. Importance of cost analysis
- c. Types of production system
- d. Objectives of material management
- e. Delegation of authority
- f. Qualifications of a cost estimator
- g. Industrial ownership
- h. Scope of industrial management
- i. Objectives of Purchase management
- j. Continuous review system

SECTION-B

- Q2. How does break even analysis help managers to take business decision especially when fixed and variable costs are changing? Explain.
- Q3. Explain the procedure of estimating cost in manufacturing operations.
- Q4. Critically appraise Taylor's theory of scientific management.
- Q5. Describe various types of organisation with example from recent business environment.
- Q6. Write down advantages and disadvantages of various inventory control systems.

SECTION-C

- Q7. Write a detailed note on various methods of executing economic analysis of investment alternatives.
- Q8. Enumerate the methods of calculating depreciation. Also highlight merits and demerits of these methods.
- Q9. Discuss Herzberg's two factor theory of motivation. Also describe its relevance for industrial management in globalised era.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017) (Sem.-6)
WIRELESS COMMUNICATION SYSTEM

Subject Code : BTEC-602

M.Code : 71122

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1) Answer briefly :

- a) What is the difference between Long term and Short term fading?
- b) What is real time Co-channel interference?
- c) What are the limitations of conventional mobile telephone system?
- d) What are the interfaces used in GSM?
- e) What is frequency reuse?
- f) Mention the various multiple access schemes used in wireless communication?
- g) What is base station?
- h) What is the function of control channel? What are the types?
- i) What is flat fading?
- j) What do you mean by forward and reverse channel?

SECTION-B

2. What are the channel types of GSM system? Explain.
3. Explain the space diversity methods.
4. Explain the performance criteria and operation of cellular systems.
5. Write short note on LTE- Advance systems.
6. Explain Pure ALOHA and Slotted ALOHA in detail.

SECTION-C

7. Differentiate the analog & digital cellular systems with their operating capacities.
8. Mention the two frequency reuse schemes and explain N-cell reuse pattern in detail for four & seven cell reuse with illustrative diagrams.
9. Discuss the salient features of FDMA and TDMA techniques.

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Roll No.

Total No. of Questions : 05

Total No. of Pages : 02

B.Tech.(E o 2017) (Sem.-7,8)

EMBEDDED SYSTEMS

Subject Code : BTEC-701

M.Code : 71910

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Write briefly :

- a) Explain the concept of thumb instructions in ARM processor.
- b) Which assembly instruction would you use to load 4 words starting from the memory location 0×80000000 into the registers r0-r3?
- c) Describe the significance of ARMsd and ARMulator.
- d) Explain process status register (PSR) for ARM.
- e) Assume that x is an array of integers, and i and j are integers. Convert the following C statements into ARM assembly language.
 - (i) $x[i] = j$;
 - (ii) $x[j] = x[i]$;
- f) Differentiate between CPSR and SPSR.
- g) Discuss the role of write-back cache in ARM processors.
- h) How is ARM processor different from other processors?
- i) Give different applications of ARM processors.
- j) List down the differences between ARM and Thumb Instructions.

SECTION-B

2. Discuss the role of L1 and L2 cache memories in ARM processor.
3. How ZIGBEE can be interfaced with an ARM processor. Draw and explain an interfacing diagram.
4. With a neat diagram explain the different general purpose registers of ARM processors.
5. Explain the use of pointers with example.
6. Differentiate between conditional jump and unconditional jump instructions using appropriate examples.

SECTION-C

7. What are addressing modes? Explain various addressing modes with two examples of each used for ARM processors.
8. Use ldm and stm to write a short sequence of ARM assembly language to copy 16 words of data from a source address to a destination address. Assume that the source address is already loaded in r0 and the destination address is already loaded in r1. You may use registers r2 through r5 to hold values as needed. Your code is allowed to modify r0 and/or r1.
9. Write notes on the following :
 - a) I²C Bus
 - b) JTAG

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Roll No. _____ **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017) (Sem.-7,8)
EMBEDDED SYSTEMS
Subject Code : BTEC-701
M.Code : 71910

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

- SECTION-A is COMPULSORY** consisting of TEN questions carrying TWO marks each.
- SECTION-B** contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
- SECTION-C** contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

- Write briefly :**
 - Explain the concept of thumb instructions in ARM processor.
 - Which assembly instruction would you use to load 4 words starting from the memory location 0×80000000 into the registers r0-r3?
 - Describe the significance of ARMsd and ARMulator.
 - Explain process status register (PSR) for ARM.
 - Assume that x is an array of integers, and i and j are integers. Convert the following C statements into ARM assembly language.

```
(i) x[i] = j;
(ii) x[j] = x[i];
```

- Differentiate between CPSR and SPSR.
- Discuss the role of write-back cache in ARM processors.
- How is ARM processor different from other processors?
- Give different applications of ARM processors.
- List down the differences between ARM and Thumb Instructions.

SECTION-B

- Discuss the role of L1 and L2 cache memories in ARM processor.
- How ZIGBEE can be interfaced with an ARM processor. Draw and explain an interfacing diagram.
- With a neat diagram explain the different general purpose registers of ARM processors.
- Explain the use of pointers with example.
- Differentiate between conditional jump and unconditional jump instructions using appropriate examples.

SECTION-C

- What are addressing modes? Explain various addressing modes with two examples of each used for ARM processors.
- Use ldm and stm to write a short sequence of ARM assembly language to copy 16 words of data from a source address to a destination address. Assume that the source address is already loaded in r0 and the destination address is already loaded in r1. You may use registers r2 through r5 to hold values as needed. Your code is allowed to modify r0 and/or r1.
- Write notes on the following :
 - I²C Bus
 - JTAG

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SECTION-B

- Q2) Establish the necessary threshold condition for Laser diode. Discuss Injection laser characteristics, Mode Hopping, Frequency chirp.
- Q3) Write and apply Maxwell equations for optical fiber communication. Derive the standard wave equation using them.
- Q4) Explain the design and working principle of APD. What are its advantages and disadvantages? Discuss compromises to improve its performances.
- Q5) Estimate the CW operating lifetime for an AlGaAs LED with an activation energy of 0.6 eV and a constant of proportionality (β_0) of $2.3 \times 10^3 \text{ h}^{-1}$ when the junction temperature of device is constant at 50°C. It may be assumed that the LED is no longer useful when its optical power is 0.8 of its value.
- Q6) Discuss in short Linear and Stimulated Scattering, Frequency chirping.

SECTION-C

- Q7) How does light propagate through optical fibers? What is its basic principle? Establish the condition for light ray transmission through a step indexed fiber on the basis of ray theory. Distinguish the fibers types on the basis of light propagation and bandwidth : SI-MMF, GI-MMF, and SMF.
- Q8) Explain in detail the multiplexing technique: WDM, OTDM, Subscriber Multiplexing and Code Division Multiplexing used in optical communication.
- Q9) a) Write short note on : DFB lasers, Responsivity.
- b) A multimode step index fiber is operating at a wavelength of 0.85 μm with a core diameter of 80 μm and a relative index difference 1.5%. If the refractive index of core is 1.48. Determine :
- Normalized frequency for the fiber.
 - The number of guided modes.

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SECTION-B

2. Explain in detail the TCP/IP protocol suite.
3. Discuss about Selective Repeat ARQ protocol. What are its advantages over Go-Back-N ARQ?
4. What is congestion control? Explain **any one** of the congestion prevention policies.
5. Discuss about the various modes of working in IPSec.
6. What is IP address? What is its use? Also discuss about the classful IPv4 addressing.

SECTION-C

7. Explain how the token bucket algorithm is used for congestion control, with an example.
8. Explain link state routing protocol in detail. Compare it briefly with distance vector routing protocol.
9. Explain briefly about :
 - a) IPv6
 - b) Virtual LANs
 - c) Node lookup in peer-to-peer networks

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

SECTION-B

2. Discuss the need of Human Resources Management.
3. Discuss the objective of Human Resource Planning.
4. Write a note on centralised & decentralised recruitment.
5. What do you understand by selection process?
6. Write a note on worker participation.

SECTION-C

7. Explain the major challenges faced by modern HR Managers.
8. Describe the concept and purpose of training. Give various methods for training of industrial workers.
9. Discuss the selection procedure followed in an organization.

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SECTION-B

- 2) Describe the architecture of mobile computing.
- 3) Illustrate packet delivery mechanism in Mobile IP network with a neat diagram.
- 4) What is encapsulation? Explain in detail the various encapsulation techniques in mobile IP.
- 5) Discuss in detail Bluetooth technology.
- 6) Explain 802.11b standard.

SECTION-C

- 7) Discuss and compare the various mechanism used to improve the TCP performance in mobile networks.
- 8) With a neat diagram explain how packet delivery to and from a mobile node is transferred in mobile IP.
- 9) Discuss in detail the components and interfaces of WAP architecture.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017 E-III (Sem.-7)

ROBOTICS

Subject Code : BTEC-917

M.Code : 71922

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) What do you mean by robot anatomy?
- b) Write the joint notation for Spherical Robot and Articulated Robot.
- c) What do you mean by time of flight in laser rangefinder?
- d) What are encoders? How do they differ from resolvers?
- e) What are grippers? Name the types of gripper.
- f) Compare hydraulic and pneumatic robot drive systems.
- g) What do you mean by data reduction in machine vision?
- h) What is segmentation in machine vision?
- i) What do you mean by forward kinematics?
- j) What is robot programming? What are the types of robot programming?

SECTION-B

2. With the help of suitable diagrams explain the classification of robots on the basis of coordinate systems.
3. Explain the working of two and three fingered grippers with suitable diagrams.
4. Explain in detail the image processing and analysis technique in machine vision.
5. Discuss about direct and inverse kinematics.
6. Explain the VAL robot programming in detail.

SECTION-C

7. Explain the operational principles, working and applications of servo motors.
8.
 - a) Explain the lighting techniques used in machine vision.
 - b) Write the applications of machine vision with examples.
9. Explain the Denavit-Hartenberg (D-H) representation for kinematic description of robotic manipulator.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) (2012 to 2017 E-II) (Sem.-7)

ARTIFICIAL INTELLIGENCE TECHNIQUES & APPLICATIONS

Subject Code : BTEC-911

M.Code : 71915

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- (a) What is the difference between crisp value and fuzzy value?
- (b) Draw labeled diagram of biological neuron.
- (c) What does fuzzy membership signify and why does it lie between 0 and 1?
- (d) What are the four operations in fuzzy set theory?
- (e) What does bipolar and binary mean in neural network?
- (f) Give the architecture of Adaline.
- (g) What is the function of fuzzy inference system?
- (h) Explain the concept of crossover in GA.
- (i) List two supervised and unsupervised learning methods.
- (j) Fuzzy Set $A=[0.2 \ 0.5 \ 0.8 \ 0.4]$ and $B=[0.8 \ 0.4 \ 0.5 \ 0.1]$

Find $A \cup B$ and A / B

SECTION-B

2. Explain in detail the learning rules for neural networks. What is the significance of perceptron learning and delta learning?
3. With the help of venn diagram and suitable example, explain seven properties of fuzzy in fuzzy set theory.
4. What is the meaning of supervised learning and unsupervised learning of neural network? Explain.
5. Develop perceptron for AND function with bipolar input and bipolar target.
6. What is the need of :
 - (a) Associative memories
 - (b) Self organizing networks

SECTION-C

7. What are Genetic algorithms? Explain the functioning of GA. How the adjustment of strategy parameters like population size, mutation and crossover probabilities is done? Explain the travelling sales man route planning effectiveness with GA.
8. How artificial Neural network helps in forecasting the weather? What are different neural network models? Explain their architecture and mathematical modeling.
9. How fuzzy set theory differs from classical set theory? How fuzzy rules and membership are selected for controlling the temperature and humidity of an air conditioner?

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SECTION-B

11. Solve the below recurrence relation using substitution method.

$$T(n) = \begin{cases} T\left(\frac{n}{2}\right) + n^2; n > 1 \\ 1 & ; n = 1 \end{cases}$$

12. Write pseudo code to implement bracket matching in an expression using stack. Consider expression can have '()', '{}', and '[']' brackets.
13. Explain with example insertion and deletion in a B+ tree.
14. Compare quick and merge sort for best, average and worst case scenarios with help of examples for each.
15. Construct MAX-HEAP for the following input by inserting elements one after another. Show heap after each iteration.

20, 55, 16, 102, 13, 78, 94

SECTION-C

16. Convert the following infix expression to postfix. Illustrate each step clearly.

$$a*(b \wedge c (d/e - f) \wedge g) + h$$

17. Write function to merge two sorted lists of length L1 and L2 respectively. Time complexity of function should not be greater than O (L1 + L2).
18. Write the algorithm for pre-order tree traversal. Also show the steps of this algorithm on an example set of numbers.

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18. Write the algorithm for pre-order tree traversal. Also show the steps of this algorithm on an example set of numbers.
17. Write function to merge two sorted lists of length L1 and L2 respectively. Time complexity of function should not be greater than $O(L1 + L2)$.
16. Convert the following infix expression to postfix. Illustrate each step clearly.

$$a^*(b^c(d^e - f)^g) + h$$

SECTION-C

15. Construct MAX-HEAP for the following input by inserting elements one after another. Show heap after each iteration.
20, 55, 16, 102, 13, 78, 94
14. Compare quick and merge sort for best, average and worst case scenarios with help of examples for each.
13. Explain with example insertion and deletion in a B+ tree.
12. Write pseudo code to implement bracket matching in an expression using stack. Consider expression can have '(', ')', '{', '}', '[' and ']' brackets.

$$T(n) = \begin{cases} 1 & n = 1 \\ 2T\left(\frac{n}{2}\right) + n^2, n > 1 \end{cases}$$

11. Solve the below recurrence relation using substitution method.

SECTION-B

1. Write short note on space complexity.
2. What are the components of space occupied by a program?
3. Array and binary heap can be used to implement priority queue. Compare these methods with respect to time complexity for insertion and deletion.
4. Suggest an application of queue. Explain how queue is a better choice than array for that application.
5. Advantages of doubly linked list over singly linked list.
6. Differentiate between Binary Search Tree and AVL Tree.
7. What is a K-complete graph?
8. Differentiate between directed and undirected graph.
9. Discuss pros and cons of Adjacency list representation of a graph.
10. What is Time complexity for searching in a BST in worst case? And Why?

SECTION-A

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

INSTRUCTIONS TO CANDIDATES :

Time : 3 Hrs. Max. Marks : 60

B.Tech.(CSE) (2018 Batch) (Sem.-3)
DATA STRUCTURE & ALGORITHMS
 Subject Code : BTCS-301-18
 M.Code : 76436

Total No. of Questions : 18

Total No. of Pages : 02

Roll No.

SECTION-B

- 11) Design a 5×32 decoder using 3×8 decoder and summarize that how many decoders are required for designing?
- 12) Design a two bit magnitude comparator and draw its logic circuit.
- 13) Elucidate the design procedure of synchronous sequential circuits.
- 14) Perform the following addition by 2's complement :
 - a) 20 to -26
 - b) 25 to -15.
- 15) What are various laws for Boolean logic simplification?

SECTION-C

- 16) Design and implement BCD to gray code converter using PAL.
- 17) a) What are the different logic gates? Give their truth tables.
b) Write a short note on static, bipolar and MOSFET RAM cell.
- 18) Draw the logic circuit, excitation table & truth table of RS Flip-Flop.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-3)

COMPUTER ARCHITECTURE

Subject Code : BTCS-301

M.Code : 56591

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) What is the difference between machine and instruction cycles?
- 2) What are the memory reference instructions? Give examples.
- 3) What is hardwired control? What are its advantages?
- 4) What is control memory?
- 5) Explain the concept of virtual memory.
- 6) What is the role of ROM memory in a computer system?
- 7) What is register transfer language?
- 8) What is an instruction pipeline?
- 9) What are registers? Can they be called memory?
- 10) What is Microprocessor?

SECTION-B

- 11) What is memory management hardware? Explain.
- 12) Explain the organization of a typical computer system.
- 13) What is pipelined control? Explain.
- 14) What are multilevel memory systems? Explain with the help of a diagram.
- 15) How does a RISC organize CPU works? What are its characteristics and advantages?

SECTION-C

- 16) What are the ways in which the peripheral devices may be transfer data to a computer system? What are the features of each of these ways? Compare the pros and cons of each type of data transfer.
- 17) Discuss the working of the vector and array processors.
- 18) Explain the design and working of a micro-programmed control unit.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-3)

DIGITAL CIRCUITS & LOGIC DESIGN

Subject Code : BTCS-303

M.Code : 56593

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Perform 2's complement subtraction of $(7)_{10} - (11)_{10}$
- 2) What is race around condition? How it can be avoided?
- 3) How many states can an n -bit Ring counter and an n -bit Johnson's counter have?
- 4) What is meant by the term edge triggered?
- 5) How many flip-flops are required to design a mod-7 up down counter?
- 6) What is difference between static RAM and dynamic RAM?
- 7) What is EEPROM?
- 8) What are the advantages of ring counter?
- 9) Differentiate between A/D and D/A conversion techniques.
- 10) Write a short note on : SOP and POS.

SECTION-B

- 11) Prove the following identities using Boolean algebra :
 $(A + B)(A + (AB)')C + A'(B + C') + A'B + ABC = C(A + B) + A'(B + C')$
- 12) A microprocessor uses RAM chips of 1024×1 capacity.
 - (a) How many chips will be required and how many address lines will be connected to provide capacity of 1024 bytes?
 - (b) How many chips will be required to obtain a memory of capacity of 16 K bytes?

- 13) What are the characteristics of digital ICs used to compute their performance?
- 14) Design an FPLA circuit, programmed to implement a 3-bit binary to Gray conversion.
- 15) Design a sequence detector to detect the sequence **1010** (overlapping of the sequence is permitted). Use D flip-flop to design the circuit. Show the intermediate design steps :
 - (a) State Diagram
 - (b) Truth Table/ Excitation table
 - (c) Logic Diagram of the circuit.

SECTION-C

- 16) A combinational circuit has 3 inputs A, B, C and output F. F is true for following input combinations

A is False, B is True

A is False, C is True

A, B, C are False

A, B, C are True

- (a) Write the Truth table for F. Use the convention *True* = 1 and *False* = 0.
- (b) Write the simplified expression for F in SOP form.
- (c) Write the simplified expression for F in POS form.

Draw logic circuit using minimum number of 2-input NAND gates.

- 17) Design a 8 to 1 multiplexer by using four variable function given by
 $F(A, B, C, D) = \Sigma m(0,1,3,4,8,9,15)$
- 18) What are synchronous counters? Design a 3-bit Gray code counter using T-Flip Flop.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2018 Batch) (Sem.-3)
OBJECT ORIENTED PROGRAMMING
Subject Code : BTCS-302-18
M.Code : 76437

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Define Class.
2. What is Pointer operator? State with example?
3. What are the special characteristics of friend function?
4. What is pure virtual function?
5. What is mean by Polymorphism?
6. How static data member of class is defined?
7. List the operators which are not possible to overload.
8. Benefits of Object oriented Programming.
9. Types of Inheritance.
10. What is a token?

SECTION-B

11. Write C++ program to overload + operator to add two matrices.
12. How are exception handle in class?
13. Explain Virtual function.
14. Write a C++ program to concatenate two strings.
15. What are the drawbacks of procedural and structural programming language?

SECTION-C

16. Write a C++ program that erases all the elements in a list using iterators.
17. What is Multi-level inheritance? Explain it with suitable example.
18. Describe goto, break, continue & return with suitable example.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

SECTION-B

11. Write the advantage and disadvantage of Array and Link List data structures.
12. What is algorithm complexity? How it is measured?
13. Write an algorithm to convert infix expression to postfix expression by taking a suitable example.
14. Compare direct address tables with hash tables.
15. Illustrate the concept of depth-first search traversing of graph.

SECTION-C

16. What is Hash function? How linear probing is used to resolve collision in Hash Tables?
17. Explain various methods in which a binary tree can be represented. Write **any one** in detail with example.
18. Write an algorithm to sort an array of integers in the descending order using bubble sort.

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SECTION-B

11. Express $f(x) = x$ as a half-range cosine series in $0 < x < 2$.
12. Using the Laplace transform, evaluate

$$\int_0^{\infty} t e^{-3t} \sin t \, dt$$

13. Solve the following equation

$$\frac{\partial^3 z}{\partial x^3} - 4 \frac{\partial^3 z}{\partial x^2 \partial y} + 4 \frac{\partial^3 z}{\partial x \partial y^2} = 0$$

14. a) Service calls come to a maintenance center, according to a Poisson process and, on the average, 2.7 calls come per minute. Find the probability that (a) no more than 4 calls come in any minute ; (b) fewer than 2 calls came in any minute.
- b) Find the value of c such that $P(|X - 25| < c) = 0.9544$ where $X \sim N(25, 36)$. Given that $P(Z < -2) = 0.0228$ and $P(Z < -1.69) = 0.0456$, Z being a standard normal variate.
15. A survey of 240 families with 4 children each revealed the following distribution :

No. of boys	4	3	2	1	0
No. of families	10	55	105	58	12

Is the result consistent with the hypothesis that male and female births are equally probable? Use chi-square value for 4 & 5 d.f. at 5% level of significance is 9.49 & 11.07 respectively.

SECTION-C

16. Prove that the function $f(z)$ define by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$, $z \neq 0$ and $f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist.

17. Determine the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using the power method. Take $[1, 0, 0]^T$ as initial eigen vector.
18. a) Using Euler's method, find an approximate value of y corresponding to $x = 0.5$ given that $\frac{dy}{dx} = x + y$, and $y = 1$, where $x = 0$. Use step size 0.1
- b) Apply Gauss elimination method to solve the equations

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4.$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/ECE/IT) (2012 to 2017) (Sem.-3)
OBJECT ORIENTED PROGRAMMING USING C++
Subject Code : BTCS-305
M.Code : 56595

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) What is data abstraction?
- 2) What do you mean by dynamic initialization of objects?
- 3) List down at least 3 differences between Static and Dynamic Memory Allocation.
- 4) "*Inheritance supports the concept of reusability*". Comment.
- 5) What is a friend function and friend class?
- 6) Explain control structures.
- 7) What is a reference variable? What is its major use?
- 8) Define Constructor and Destructor.
- 9) How is polymorphism achieved at compile time and runtime?
- 10) Differentiate between static and dynamic binding.

SECTION-B

- 11) What is the use of default & copy constructors? Is a constructor mandatory for a Class? Explain by giving examples in each case.
- 12) Explain how base class member functions can be invoked in a derived class if the derived class also has a member function with the same name.
- 13) What is a virtual function? Explain its usage with example.
- 14) Explain what is overloaded operator & how does a compiler proceed to execute an overloaded operator.
- 15) Write a program to exchange values between two classes using the concept of friend functions.

SECTION-C

- 16) Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks :
 - a) To create the vector
 - b) To modify the value of a given element
 - c) To multiply by a scalar value
 - d) To display the vector in the form (10, 20, 30,...)
 - e) Write a program to test your class
- 17) Write a program to overload the plus operator to add two complex numbers.
- 18) What is the use of class templates? Explain the different ways to instantiate a template functions.

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Roll No.

Total No. of Pages : 02

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B.Tech.(CSE) (2018 Batch) (Sem.-3)

MATHEMATICS-III

Subject Code : BTAM304-18

M.Code : 76438

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Solve the following :

- 1) Evaluate the limit for the function $f(x, y) = \frac{2x-y}{2x+y}$ if exists as $(x, y) \rightarrow (0, 0)$
- 2) Evaluate the integral $\int_0^1 \int_{y^2}^{1-y} \int_0^{1-x} xz dx dy$
- 3) Check the convergence of the following sequences whose nth term is given by $a_n = \frac{n^2 + 1}{n^2 - 1}$
- 4) State Leibnitz test for convergence of an alternating series.
- 5) Write down the Taylor's series expansion for $\ln(1+x)$ about $x=0$.
- 6) Define Clairaut's equation and obtain its general solution.
- 7) Solve the differential equation $\frac{dy}{dx} - y \tan x = 3e^{-\sin x}$
- 8) Define Exact differential equation and obtain the necessary condition for $M(x, y) dx + N(x, y) dy = 0$ to be exact.
- 9) Solve the differential equation $\frac{d^2y}{dx^2} - 14\frac{dy}{dx} + 49y = 0$
- 10) Find particular integral for $\frac{d^2y}{dx^2} + y = x^2$

SECTION-B

- 11) Find the minimum value of the function $x^2 + y^2 + z^2$ subjected to $x + y + z = 3a$.
- 12) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dy dx$, by changing into polar coordinates.
- 13) Discuss the convergence of the series : $\frac{1^2}{4^2} + \frac{1^2 5^2}{4^2 8^2} + \frac{1^2 5^2 9^2}{4^2 8^2 12^2} + \dots$ to ∞
- 14) Solve the differential equation :
- $$(xy^2 - e^{\frac{1}{x^3}}) dx - x^2 y dy = 0$$
- 15) Solve the differential equation $\frac{d^2 y}{dx^2} - 6 \frac{dy}{dx} + 13y = e^{3x} \sin 4x$

SECTION-C

- 16) a) Find the interval of convergence for the infinite series : $x - \frac{x^3}{3} + \frac{x^5}{5} - \dots$ to ∞ .
- b) Find the area bounded by the parabola $y = x^2$ and line $y = 2x + 3$
- 17) a) Solve the differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$.
- b) Solve the differential equation $xp^2 - 2yp + x = 0$, where $p = \frac{dy}{dx}$
- 18) a) Apply method of variation of parameters to solve $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = e^x \tan x$,
- b) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 5y = \sin(\ln x)$

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12/E

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/ECE) (2018 Batch) (Sem.-3)

DEVELOPMENT OF SOCIETIES

Subject Code : HSMC-101-18

M.Code : 76439

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Clan
2. Social System
3. Socialism
4. Jajmani system
5. Development
6. Swaraj
7. Buddhist Economics
8. Political System
9. Decentralization
10. Relation between human beings and society

SECTION-B

11. Elaborate on how society came into being?
12. Compare different models of social structures and their evolution.
13. Write in brief about different models of governing system.
14. Compare the concept of development in pre-British and British period.
15. Compare capitalism and socialism models of economic development.

SECTION-C

16. Explain in detail about different types of social systems.
17. How the ideas of political system originated and explain with reference to history?
18. Elaborate and critically analyse E.F. Schumacher's idea of development.

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18/M

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-4)

OPERATING SYSTEMS

Subject Code : BTCS-401

M.Code : 56604

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) Write at least two functions of Operating System.
- 2) Write a brief note on Shell.
- 3) Explain the term PCB.
- 4) Explain in brief about process synchronization.
- 5) Differentiate between External and Internal Fragmentation.
- 6) Write at least two differences between Paging and Segmentation scheme of memory management.
- 7) Why is disk scheduling important?
- 8) Differentiate between protection and security.
- 9) Define the term file. List various attributes of a file.
- 10) Write at least two characteristics of Windows based Operating Systems.

SECTION-B

- 11) Explain the following terms in brief :
 - a) Multiprogramming Systems
 - b) Time Sharing Systems
- 12) Define the term deadlock. Explain the deadlock prevention in detail.
- 13) Explain with an example the concept of shared segments in detail.
- 14) Write a brief note on File System Architecture.
- 15) Differentiate between LINUX and Windows based operating systems.

SECTION-C

- 16) What is disk scheduling? Explain in detail the various algorithms of Disk scheduling with examples.
- 17)
 - a) Explain any five LINUX Operating System commands with example.
 - b) Explain in detail the layered structure of an operating System.
- 18) Write a detailed note on Multiprocessor and distributed operating systems.

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4/1/2020 (M)

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE/IT) (2012 to 2017)

(Sem.-4)

MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

Subject Code : BTCS-404

M.Code : 56607

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Explain the following :

- 1) Specify the number of registers in a 2K memory chip.
- 2) What is a bus?
- 3) What is the function of WR signal on the memory chip?
- 4) What is a flag?
- 5) What is the function of ALE signals of 8085 microprocessor?
- 6) Write an instruction to clear the accumulator.
- 7) What is an ASCII code?
- 8) Name four categories of 8085 instructions that manipulate data.
- 9) Why data bus is bidirectional?
- 10) Name the two 8085 signals that are used to latch data in an output port?

SECTION-B

- 11) Specify the output at PORT1 if the following program is executed :

```
MVI B,82H
MOV A,B
MOV C,A
MVI D,37H
OUT PORT1
HLT
```

- 12) Explain different addressing modes used in 8085 microprocessor.
13) Explain in detail about Microprocessor controlled temperature system.
14) Explain in detail the process of Direct Memory Access (DMA).
15) Explain the various flags in 8085 microprocessor.

SECTION-C

- 16) A set of eight data bytes is stored in memory locations starting from XX70H. Write a program to subtract two bytes at a time and store the result in a sequential order in memory locations starting from XX70H.

Data (H) F9, 38, A7, 56, 98, A2, F4, 67

- 17) a) Explain various Registers present in 8085 microprocessor.
b) What are hardware interrupts present in 8085 microprocessor?
18) Describe the functional block diagram of 8085 in detail.

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3/1/2020 (M)

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/IT) (2012 to 2017) (Sem.-4)

DISCRETE STRUCTURES

Subject Code : BTCS-402

M.Code : 71106

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- 1) Define Poset.
- 2) Define Anti-symmetric relation.
- 3) Write General Inclusion-Exclusion principle.
- 4) State Involution Law in Boolean algebra.
- 5) Find the number of distinct permutations that can be formed from all the letters of word 'PROGRAMMING'.
- 6) Give an example of graph that has Euler's circuit but Hamiltonian circuit.
- 7) Define Cyclic Subgroup.
- 8) Write generating function of $S(n) = 2 \cdot 7^n, n \geq 0$.
- 9) Define Directed Graph.
- 10) What is the difference between a graph and a tree?

SECTION-B

- 11) If R is equivalence relation on a set A , then show that R^{-1} is also equivalence relation on A .
- 12) Reduce the following Boolean expressions to complete sum of products form:
- $f(x,y,z) = x(y'z)'$
 - $f(x,y,z) = z(x'+y) + y'$
- 13) Show that in group G , $(xy)^{-1} = y^{-1}x^{-1} \forall x,y \in G$.
- 14) Prove that in any graph :
- There are even number of vertices of odd degree.
 - Sum of degree of all the vertices is even.
- 15) Define and give example of :
- Isomorphism
 - Integral domain.

SECTION-C

- 16) Solve the recurrence relation by using generating function :
- $$S(n-2) = S(n-1) + S(n), \text{ where } S(0) = 1, S(1) = 1.$$
- 17) State and prove Euler's theorem in graph theory.
- 18) If $\{B, +, \cdot, '\}$ is Boolean Algebra, then :
- If $x + y = x + z$ and $x' + y = x' + z$ then $y = z$.
 - If $x \cdot y = x \cdot z$ and $x' \cdot y = x' \cdot z$ then $y = z$.

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Total No. of Pages : 02

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B.Tech.(CSE/IT) (2012 to 2017) (Sem.-4)
SYSTEM PROGRAMMING
Subject Code : BTCS-405
M.Code : 56608

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. What is the function of loader? Explain.
2. "File manager function of the operating system manages the virtual memory". True or False. Comment.
3. Explain the process of booting a machine.
4. What is purpose of system calls?
5. What are relocating loaders?
6. What are the basic features of system programming?
7. Explain conditional macro expansion.
8. What is linker?
9. What is Debugger?
10. What are the limitations of assemblers?

SECTION-B

11. List out the phases of compiler in detail with the help of diagram.
12. Explain the design of one pass assembler and multi pass assembler.
13. Write the advantage of dynamic linking. Write the absolute loader algorithm.
14. What are the three categories of editor's devices? Differentiate full screen editor and multi window editor.
15. Discuss in detail about debugging functions and capabilities.

SECTION-C

16. Discuss in detail about the conditional and recursive macro expansion.
17. Explain all the stages of intermediate code generation and code optimization techniques.
18. Elaborate case study of MS word, DOS editor and vi editor.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE)/(IT) (2012 to 2017) (Sem.-4)

COMPUTER NETWORKS-I

Subject Code : BTCS-403

M.Code : 56606

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

1. What are the various types of computer networks?
2. How is ISO-OSI model different from TCP/IP model?
3. Why do we use ALOHA protocol?
4. What is a Domain Name System (DNS)?
5. What is the difference between Intranet and Internet?
6. What is WWW?
7. Which protocol is used behind Email?
8. Why do we use sliding window protocols?
9. Write the Nyquist formula.
10. What is the difference between attenuation and distortion?

SECTION-B

11. Explain the Binary Exponential Back off algorithm.
12. Write a short note on Go-back N ARQ protocol.
13. Explain leaky bucket and token bucket algorithms.
14. Justify the role of congestion control at network layer and various approaches used in it.
15. Write a short note on :
 - a) Twister Pair
 - b) Coaxial Cable
 - c) Fiber optics.

SECTION-C

16. A 2 km long broadcast LAN has 10^7 bps bandwidth and uses CSMA/CD. The signal travels along the wire at 2×10^8 m/s. What is the minimum packet size that can be used on this network?
17. Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a timeout occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission.
18. Explain the idea of Digital Signature in terms of network security using any real life example. Justify properly.

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9/E

Roll No.

Total No. of Pages : 02

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B.Tech.(CSE/IT) (2012 to 2017) (Sem.-5)

COMPUTER NETWORKS-II

Subject Code : BTCS-501

M.Code : 70534

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

Write briefly :

1. Explain basic principles of network security.
2. What is MAC address?
3. What is use of classes in IPv4?
4. What is use of frequency modulation?
5. Explain port address.
6. What is frequency reuse?
7. Explain Local multipoint Distribution System.
8. What is PAN?
9. Explain payload.
10. What is system capacity?

SECTION-B

11. Differentiate between 'Authentication Header' and 'Encapsulation Security Payload'.
12. Differentiate between TDMA and CDMA.
13. Explain various channel assignment strategies.
14. What are the application areas of Adhoc networks?
15. Explain internet key exchange system.

SECTION-C

16. What are the different routing protocols used in Ad hoc networks?
17. Explain IKE encoding in detail.
18. Explain the working of wireless local loop.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2012 to 2017) (Sem.-5)
DESIGN & ANALYSIS OF ALGORITHMS
Subject Code : BTCS-503
M.Code : 70536

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer the following briefly :

- 1) What is closest pair problem?
- 2) How dynamic programming is used to solve knapsack problem?
- 3) How time complexity of an algorithm is different from space complexity?
- 4) Difference between NP, NP complete and NP-hard Problem?
- 5) Write any two applications of Fast Fourier Transform.
- 6) Write a short note on : Strassen's algorithm.
- 7) What is 3 SAT problem?
- 8) What are the applications of BFS?
- 9) Differentiate between Polynomial and Exponential running time.
- 10) What is an algorithm?

SECTION-B

- 11) Bring out the differences between Prim's and Kruskal's algorithm. Also compare with respect to efficiency analysis.
- 12) Use the substitution method to prove a tight asymptotic lower bound (Ω -notation) on the solution to the recurrence
$$T(n) = 4T(n/2) + n^2$$
- 13) Suppose that $H[1, \dots, n]$ is an array containing a Min-Heap. Give pseudocode for an algorithm $\text{Extract-Min}(H, n)$ that removes the smallest element from the heap H of size n and returns its value. Analyze the time complexity of your algorithm. Explain your algorithm.
- 14) Suppose we use Dijkstra's greedy, single source shortest path algorithm on an undirected graph. What constraint must we have for the algorithm to work and why?
- 15) Suppose you were to drive from Delhi to Mumbai. Your gas tank, when full, holds enough gas to travel m miles, and you have a map that gives distances between gas stations along the route. Let $d_1 < d_2 < \dots < d_n$ be the locations of all the gas stations along the route where d_i is the distance from Delhi to the gas station. You can assume that the distance between neighboring gas stations is at most m miles. Your goal is to make as few gas stops as possible along the way. Give the most efficient algorithm you can find to determine at which gas stations you should stop and prove that your strategy yields an optimal solution. Be sure to give the time complexity of your algorithm as a function of n .

SECTION-C

- 16) A max heap is given with n elements and its height is $\log(n)$. Write an efficient algorithm to find minimum element in heap. Also calculate the time and space complexity.
- 17) Give the solution for Knapsack with Branch and Bound. The capacity of Knapsack is $m = 12$. There are 5 objects with profit $(p_1, p_2, p_3, p_4, p_5) = (10, 15, 6, 8, 4)$ and weights $(w_1, w_2, w_3, w_4, w_5) = (4, 6, 3, 4, 2)$.
- 18) Write a program for recursive binary search to find the given element within array. For What data binary search is not applicable?

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Roll No.

Total No. of Pages : 02

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B.Tech.(CSE) (2012 to 2017) (Sem.-5)

COMPUTER GRAPHICS

Subject Code : BTCS-504

M.Code : 70537

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

1. Define aspect ratio.
2. Explain Raster Scan System.
3. Write **any two** Graphic Tools.
4. What is the role of Scaling?
5. What is point clipping?
6. Discuss boundary fill algorithm.
7. What is scan line algorithm?
8. **Define** composite Transformations.
9. **Define** Gouraud shading.
10. Write a short note on Z buffer algorithm.

SECTION-B

11. Describe computer graphics and its applications in animation.
12. Differentiate parallel and perspective projections and derive their projection matrices.
13. Write a short note on Midpoint Ellipse Algorithm.
14. With suitable examples explain all 3D transformations.
15. What are the advantages of Painter Algorithm in Computer Graphics?

SECTION-C

16. Give the syntax of drawing a line in computer graphics using various algorithms.
17. Discuss hidden edge or visible edge techniques.
18. Define following with example :
 - a) Rendering
 - b) Antialiasing

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SECTION-B

11. Compare the features of VGA and SVGA display Architectures.
12. Compare and contrast IDE and SCSI interfaces.
13. Explain DMA controller in detail.
14. What do you understand from interface standards? Explain the characteristics of the mostly used interface standard.
15. Explain the cost performance analysis while designing the computer system.

SECTION-C

16. Name various types of I/O bus architectures used in PC's. Explain in detail the EISA bus architecture.
17. Explain in detail video display technologies.
18. What is the role of device drivers? Explain UNIX/Linux device drivers in detail.

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SECTION-B

- 11) What is the role of inner and outer joins in SQL? Explain in detail.
- 12) What is the effect of reading down and writing up restrictions imposed by the Bell-Lapadula model? Why is the Bell-Lapadula model a non-discretionary one?
- 13) What is a timestamp? How does the system generate timestamps? Discuss the timestamp ordering protocol for concurrency control.
- 14) Explain various recovery techniques in detail.
- 15) Explain the steps involved in query processing.

SECTION-C

- 16) Alice has a large DVD movie collection. Her friends like to borrow her DVD's, and she needs a way to keep track of who has what. She maintains a list of friends, identified by unique FID's (friend identifiers) and a list of DVD's, identified by DVDID's (DVD identifiers). With each friend is the name and the all-important telephone numbers which she can call to get the DVD back. With each DVD is the star actor name and title. Whenever a friend borrows a DVD, Alice will enter that fact into her database along with the date borrowed. Whenever the DVD gets returned, that fact, too, gets noted along with the date returned. Alice wants to keep a complete history of her friend's borrowing habits so that she can ask favors of the heavy borrowers (or perhaps refuse to make further loans to those who habitually don't return them quickly).
- 17) Determine truth/falsehood of following each statement. Briefly justify your answers
 - a) Weak Entity is an entity type that borrows all of its primary key from another entity type.
 - b) In generalization hierarchies, an entity type can be subtype of two or more entity types.
 - c) The number of relationships in a star schema is one less than the number of entities.
 - d) Middleware is used in 2-tier client-server architecture.
 - e) A fragment definition may involve join over two tables.
- 18) Explain the concept of Digital Signature certificate with a real life example.

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE) (2012 to 2017) (Sem.-6)

RDBMS-II

Subject Code : BTCS-602

M.Code : 71108

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. Write advantages of databases over file oriented system.
2. What do you mean by validation?
3. What is the role of replication in distributed database system?
4. What is 4NF?
5. What do you mean by DDL?
6. What are the features of mySQL?
7. Describe shadow paging.
8. Discuss the various components of DBMS environment and how do they relate to each other.
9. What is OLTP?
10. What is data mining?

SECTION-B

11. What do you understand by transaction? What are the properties of transactions?
12. How is cost estimated in query optimization?
13. Compare OOD and ORD.
14. What are the advantages and disadvantages of distributed database systems?
15. What is the two-phase locking protocol? Explain with suitable example.

SECTION-C

16. What do you mean by normalization? Explain with a suitable example showing normalization till 3NF.
17. Compare the Deferred update technique and immediate update recovery technique.
18. Describe the three schema architecture. How does the schema definition language support this structure?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2012 to 2017) (Sem.-6)

SIMULATION AND MODELING

Subject Code : BTCS-601

M.Code : 71107

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer briefly :

- 1) State two major advantages of simulation.
- 2) What are the major properties of the random numbers?
- 3) Mention the attributes of Discrete as well as Continuous system.
- 4) Differentiate process orientation and event orientation.
- 5) What is meant by biased and unbiased estimator? Give example.
- 6) Write the Little's formula and relationship between L , W , Lq and Wq .
- 7) Give the properties of Pseudo-Random numbers.
- 8) Elaborate the terms 'activity' and 'attribute' with respect to system simulation.
- 9) What is meant by poker test? Give example.
- 10) List any two simulation software.

SECTION-B

- 11) Take an appropriate example and discuss the concept of event scheduling and time-advance mechanism in discrete event simulation.
- 12) Describe the inverse transformation technique for Triangular and Weibull Distribution with respect to random variate generation.
- 13) Mention the objectives of a priority discipline queuing model further and differentiate the preemptive and non-preemptive priority discipline queuing model with example.
- 14) Elaborate, in detail, any one acceptance-rejection technique for stationary and non-stationary Poisson distribution.
- 15) What is test of significance and why is it important? Discuss the concept Chi-Square and Chi-Square with equal probabilities.

SECTION-C

- 16) When is it appropriate to use network queues? Briefly discuss the steady state behavior of infinite (M/M/c/infinity) and finite (M/M/c/K/K) calling population models.
- 17) Explain the role of exponential distribution and properties in statistical modeling. Also, present a detailed discussion on queuing models involving hyperexponential distributions.
- 18) Describe the following with respect to comparison and evaluation of alternate system designs :
 - a. Sampling with equal and unequal variance
 - b. Multiple Linear Regression

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE/IT) (O.E. 2012 to 2017) (Sem.-6)

HUMAN RESOURCE MANAGEMENT

Subject Code : HU-251

M.Code : 71556

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1. What do you understand by personal Management?
2. Define Human Resources Planning.
3. Discuss the role playing method of training.
4. Write a short note on wages policy in India.
5. Write a short note on Performance Appraisal.
6. Explain the term Job Specification.
7. What are basic concepts of wage administration?
8. Write a short note on Industrial Relations.
9. Discuss the importance of Social Security.
10. State the objective of HRM.

SECTION-B

11. Discuss the process of Human Resources Planning.
12. Differentiate between recruitment and selection.
13. Write a short note on Assessment centre.
14. Distinguish between Training and Development.
15. What are the elements of induction training?

SECTION-C

16. What are the methods of recruitment?
17. Write a note on :
 - a. Role of trade unions in maintaining cordial relations
 - b. Family pension scheme
18. Write a note on :
 - a. Psychological test and interviewing
 - b. Workmen's gratuity Act 1972

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SECTION-B

11. What do you mean by functional and non-functional requirements? Give at least two examples of each type of requirements.
12. Explain in detail about Object oriented software development.
13. Explain in detail about software reliability metrics.
14. Write a detailed note on white box testing.
15. Explain in detail about SEI CMMI.

SECTION-C

16. Explain the following Software life cycle models in detail :
 - a) Waterfall Model
 - b) Evolutionary Model
17. a) Explain in detail about Object modeling using UML.
b) Explain in detail about Mutation testing. Also write its advantages and disadvantages.
18. Write a detailed note on PSP and Six Sigma.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2012 to 2017 E-I) (Sem.-6)

WEB TECHNOLOGIES

Subject Code : BTCS-901

M.Code : 71110

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) URL
- 2) http
- 3) HTML
- 4) CSS
- 5) Cookies
- 6) MySQL
- 7) Inheritance
- 8) Ajax
- 9) Polymorphism
- 10) E-mail

SECTION-B

- 11) What are various types of Internet connections? Explain.
- 12) Explain tools for website creation.
- 13) Give example of dialog boxes in Java Script.
- 14) What is exceptional handling? Explain.
- 15) How MySQL is connected with PHP? Give connection string.

SECTION-C

- 16) What is XML? What are its syntax rules?
- 17) Define session. How it works and what are its advantages?
- 18) Write a note on DHTML and Style sheets.

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B.Tech
CSE

Roll No.
Total No. of Questions : 1

Total No. of Pages : 02

B.Tech.(CSE) (2012 to 2017) (Sem.-7,8)

ARTIFICIAL INTELLIGENCE

Subject Code : BTCS-701

M.Code : 71893

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Write briefly :

- 1) What is state space search?
- 2) What is Conflict Resolution Strategies?
- 3) What is an expert system shell?
- 4) What is a frame problem?
- 5) What is an inference engine?
- 6) What is a Rule based programming?
- 7) What is a monotonic Production System?
- 8) What is learning by induction?
- 9) What is probabilistic reasoning?
- 10) What is a search path?

SECTION-B

- 11) Under what conditions would it make sense to use both forward and backward chaining? Give an example where both are used.
- 12) How AI handles reasoning under uncertainty. Explain with example.
- 13) Explain the following with example :
 - a) Forward reasoning
 - b) Non Monotonic Reasoning
- 14) With examples explain how unification algorithm works?
- 15) What are the possible heuristics for the Travelling salesman problem?

SECTION-C

- 16) What do you understand by supervised and unsupervised learning? What are the major characteristics and differences between them?
- 17) What are the steps in the natural language processing? How various grammars are constructed?
- 18) Describe the similarities and differences between learning automata and genetic algorithms. Which learner would be best at finding optimal solutions to nonlinear functions? Give reasons to support your answer.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2012 to 2017) (Sem.-7,8)

THEORY OF COMPUTATION

Subject Code : BTCS-702

M.Code : 71894

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

Answer Briefly :

- Q1. Define Mealy and Moore machines.
- Q2. Define the term acceptability of a string.
- Q3. Define pumping lemma for regular sets.
- Q4. Differentiate between left linear and right linear regular grammar.
- Q5. Define yield and ambiguity in CFG.
- Q6. Give example CNF and GNF productions.
- Q7. Differentiate between deterministic and non-deterministic PDA.
- Q8. Give rules for converting CFG to PDA.
- Q9. Give instantaneous description of Turing machine.
- Q10. What do you mean by halting problem of TM?

SECTION-B

Q11. Construct a DFA equivalent to :

$M = (\{q_0, q_1, q_2, q_3\}, \{0, 1\}, \delta, q_0, \{q_3\})$, where δ is given by following state table :

State/ Σ	a	b
$\rightarrow q_0$	q_0, q_1	q_0
q_1	q_2	q_1
q_2	q_3	q_3
q_3		q_2

Q12. Explain in detail the Chomsky classification of languages.

Q13. Define regular sets and write its closure properties.

Q14. Prove that $P + PQ^*Q = a^*bQ^*$ where $P = b + aa^*b$ and Q is any regular expression. Describe any two representation of TM.

Q15. Find a reduced grammar equivalent to the given grammar.

$$S \rightarrow AC \mid B, A \rightarrow a, C \rightarrow c \mid BC, E \rightarrow aA \mid e$$

SECTION-C

Q16. Find a grammar in GNF equivalent to the grammar

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid a$$

Q17. Design Turing Machine of $\{0^n 1^n \mid n \geq 1\}$.

Q18. Describe PDA with its representations. Also write rules of converting PDA to CFG.

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SECTION-B

11. Define Cloud Computing. What are the Characteristics of cloud computing?
12. Compare Symmetric and Asymmetric Key encryption in Cloud Computing.
13. What are the benefits of virtualization using in Cloud Computing?
14. What are the advantages of "Platform as a Service" (PaaS)? Explain with example.
15. What are pros and cons in comparison of Public vs. Hybrid cloud?

SECTION-C

16. Describe the Google AppEngine Architecture and core concepts.
17. What different techniques are used for data encryption in Cloud Computing? Explain in detail.
18. Describe the IBM Smart Cloud Architecture and core Services.

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SECTION-B

11. Explain the technical metrics available for assessing the quality of test cases?
12. You have been appointed a project manager within an information systems organization. Your job is to build an application that is quite similar to others your team has built, although this one is larger and more complex. Requirements have been thoroughly documented by the customer. What software process model(s) would you choose and why?
13. Explain the software configuration management process. Highlight the role of configuration audit.
14. What is the importance of loop testing? Explain the techniques used to test loops in a program.
15. Write a short note on testing techniques for client/server systems.

SECTION-C

16. Explain various black-box techniques used to design effective test cases.
17. Write a short note on 'software quality assurance standards'.
18. Explain the following :
 - a. Alpha and beta testing
 - b. Fault based testing
 - c. Debugging process
 - d. Risk projection
 - e. Software reliability

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE/IT) (2012 to 2017 E-II) (Sem.-7,8)

BUSINESS INTELLIGENCE

Subject Code : BTCS-908

M.Code : 71900

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Define the following :

- 1) OLTP
- 2) Applications of BI
- 3) Data Cleaning
- 4) Data Transformation
- 5) Data Profiling
- 6) OLAP
- 7) Fact
- 8) Attributes
- 9) Business Metrics
- 10) BI Process

SECTION-B

- 11) Differentiate between clustering and classification.
- 12) What is Data Integration? Also explain its advantages.
- 13) Discuss in detail the architecture of data warehouse.
- 14) What are the data models? Differentiate between them.
- 15) Describe the Bayesian classification method.

SECTION-C

- 16) Explain the KDD process in detail.
- 17) Explain data cubes and its operations in detail.
- 18) Write a note on enterprising reporting and balances scorecards.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(CSE) (2012 to 2017 E-II) (Sem.-7,8)

SOFTWARE PROJECT MANAGEMENT

Subject Code : BTCS-907

M.Code : 71899

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

- 1) Write any one software process model.
- 2) Define COCOMO2 model.
- 3) What is meant by cost flow forecasting?
- 4) Define monte carlo simulation.
- 5) What is Project Sequencing?
- 6) What is software Quality Assurance Plan?
- 7) Discuss significance of Network planning.
- 8) Discuss Hackman & Oldham's Job Characteristics Model.
- 9) What are the benefits of test automation?
- 10) Write a short note on Software Reliability.

SECTION-B

- 11) What are the steps in cost-benefit analysis? Discuss the cost-benefit evaluation techniques.
- 12) Define following :
 - a. Types of Risk Management
 - b. Schedule compression
- 13) Illustrate the PERT method for identifying the critical path of project.
- 14) Distinguish between CMMI and ISO models.
- 15) What are the criteria for selecting the right person for the Job?

SECTION-C

- 16) Write in detail the monitoring and control of software project management cycle.
- 17) Discuss common aspects of Contract Management. What are the types of Contracts and its stages?
- 18) Explain different approaches for Project Management. Give the overview of any one tool for Project Management.

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Sem-3

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(IT) (Sem.-3)
DATA STRUCTURES & ALGORITHMS

Subject Code : BTIT-301-18

M.Code : 76391

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a. What is the advantage of using doubly linked list?
- b. What is the difference between data types and data structures?
- c. What is the complexity of deleting a node in case of complete binary tree?
- d. What is need for Garbage collection?
- e. State one application of Dijkstra's algorithm.
- f. How a binary tree can be represented as array structure?
- g. What is the need of having different sorting schemes?
- h. What is a pre order traversal on a tree? Give an example.
- i. State an application of stacks.
- j. What is a circular queue?

SECTION-B

2. What is a QUEUE? Write an algorithm to insert and delete elements in a DEQUE.
3. Write a program in C to implement a STACK. It should be possible to insert and delete elements in a STACK.

4. Write a function that accepts two singly linked lists L1 and L2. It should print L3, where L3 is a singly linked list and $L3 = L1 - L2$.
5. Show the result of inserting
6, 3, 5, 8, 12, 15, 18, 19, 20, 24
into an empty binary search tree
6. Construct the binary tree for the following expression
 $(2x-3z+5)(3x-y+8)$

SECTION-C

7. Suppose a sequence of numbers is given like :
5, 10, 12, 18, 56, 68, 52, 85, 95
 - a. What are the various steps in which the number 52 will be found by the Binary search?
 - b. In how many steps the number 52 will be found in the linear search.
 - c. In How many steps it will be found in the binary search that the number 83 does not exist in this array in the array

Explain the algorithm involved in each of the problems a, b, c.
8. What are the various binary tree traversal techniques? Discuss with example and algorithm.
9. Suppose the names of few students of a class are as below :
RAM, Sham, Mohan, Sohan, Vimal, Komal
It is assumed that the names of the students is represented as a single link list :
 - a. Write a algorithm to insert the name of a student RAMAN between sham and Mohan. Represent it graphically also
 - b. Write a algorithm to delete the name Vimal from the list of the students. Represent it graphically also.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(IT) (2018 Batch) (Sem.-3)
DATA STRUCTURE & ALGORITHMS**

Subject Code : BITT-301-18

M.Code : 76391

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :
 - a. What is the advantage of using doubly linked list?
 - b. What is the difference between data types and data structures?
 - c. What is the complexity of deleting a node in case of complete binary tree?
 - d. What is need for Garbage collection?
 - e. State one application of Dijkstra's algorithm.
 - f. How a binary tree can be represented as array structure?
 - g. What is the need of having different sorting schemes?
 - h. What is a pre order traversal on a tree? Give an example.
 - i. State an application of stacks.
 - j. What is a circular queue?

SECTION-B

2. What is a QUEUE? Write an algorithm to insert and delete elements in a DEQUE.
3. Write a program in C to implement a STACK. It should be possible to insert and delete elements in a STACK.

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4. Write a function that accepts two singly linked lists L1 and L2. It should print L3, where L3 is a singly linked list and $L3 = L1 - L2$.

5. Show the result of inserting
6, 3, 5, 8, 12, 15, 18, 19, 20, 24
into an empty binary search tree
6. Construct the binary tree for the following expression
 $(2x-3z+5)(3x-y+8)$

SECTION-C

7. Suppose a sequence of numbers is given like :
5, 10, 12, 18, 56, 68, 52, 85, 95
 - a. What are the various steps in which the number 52 will be found by the Binary search?
 - b. In how many steps the number 52 will be found in the linear search.
 - c. In How many steps it will be found in the binary search that the number 83 does not exist in this array in the arrayExplain the algorithm involved in each of the problems a, b, c.
8. What are the various binary tree traversal techniques? Discuss with example and algorithm.
9. Suppose the names of few students of a class are as below :
RAM, Sham, Mohan, Sohan, Vimal, Komal
It is assumed that the names of the students is represented as a single link list :
 - a. Write a algorithm to insert the name of a student RAMAN between sham and Mohan. Represent it graphically also
 - b. Write a algorithm to delete the name Vimal from the list of the students. Represent it graphically also.

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B.Tech.(IT) (2018 Batch) (Sem.-3)
OBJECT ORIENTED PROGRAMMING
Subject Code : BTIT-302-18
M.Code : 76392

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. **Answer briefly :**

- a. What is the use of copy constructors?
- b. What is the use of default constructors?
- c. Why are classes in CPP called Abstract Data Types?
- d. What is a virtual class?
- e. What is a friend functions?
- f. How are structures different from a class?
- g. What is meant by dynamic initialization of a variable?
- h. What are the advantages of polymorphism?
- i. What are the advantages of scope resoluter?
- j. Explain the difference between abstraction & data hiding.

SECTION-B

2. Write a program to copy the content of a data file to another file.
3. How are Constructors invoked in derived classes? What is a parameterised constructors?
4. How does a compiler proceed to execute an overloaded operator?
5. What are virtual functions & virtual constructors? Give relevant examples to explain.
6. How are friend functions different from member functions of a class? What is the difference between derivation & friendship?

SECTION-C

7. What do you understand by inheritance? What are the different types of inheritance?
8. Write a program in C++ to overload the +, -, operator to find the addition, subtraction, of strings.
9. Why is it necessary for constructors to know the order to declaration in base class while destructors need not know the same? What actually happens when a destructor is invoked?

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Total No. of Questions : 09

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B.Tech.(IT) (2018 Batch) (Sem.-3)

MATHEMATICS-III

Subject Code : BTAM-304-18

M.Code : 76393

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) Show that the function $f(x, y) = \frac{2x^2y}{x^4 + y^2}$ has no limit as (x, y) approaches $(0, 0)$.

b) Find the local extreme values of the function $f(x, y) = x^3 - y^3 - 2xy + 6$.

c) Sketch the region of integration for the integral

$$\int_0^{\sin x} \int_0^{\pi} y \, dy \, dx$$

and write an integral with the order of integration reversed.

d) Define convergence of a series and give an example of a convergent series.

e) Explain the limit comparison test.

f) By inspection obtain the integrating factor and solve the differential equation :

$$x \, dx = y \, dy + 2(x^2 + y^2) \, dx = 0$$

g) Check whether the following differential equation exact.

$$(2x + e^y) \, dx + x e^y \, dy = 0$$

h) Find the general solution of the differential equation $y'' + 2y' + y = 0$

- i) Verify whether the linear combination of e^x and e^{-2x} is a solution of the differential equation

$$y'' + y' - 2y = 0$$

- j) Find the Wronskian of the functions x , x^2 and x^3 .

SECTION-B

2. Solve the following integral

$$\int_0^{\ln 2} \int_0^{\sqrt{(\ln 2)^2 - y^2}} e^{\sqrt{x^2 + y^2}} dx dy$$

by converting it into an equivalent polar integral.

3. For what values of x does the following power series converge ?

$$\sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^n}{n}$$

4. Solve the differential equation $(3x^2y^3e^y + y^3 + y^2) dx + (x^3y^3e^y - xy) dy = 0$.
5. Solve the differential equation $y'' + 4y' + 4y = e^{-2x} \sin x$ by using method of variation of parameters.
6. Check the convergence of the following series

(i) $\sum_{n=1}^{\infty} \frac{(2n)!}{n!n!}$

(ii) $\sum_{n=2}^{\infty} \frac{1}{\sqrt{n} \ln n}$

SECTION-C

7. a) Find the maximum and minimum values of the function $f(x, y) = 3x + 4y$ on the circle $x^2 + y^2 = 1$.
- b) Find the volume in the first octant bounded by the coordinate planes and the surface $z = 4 - x^2 - y$.
8. State and prove Leibniz's test for alternating series.
9. Find the general solution of the equation $x^3y''' - 3xy' + 3y = 16x + 9x^2 \ln x$.

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SECTION-B

2. Explain Interrupt and DMA mode for I/O access.
3. Explain booth multiplier in detail.
4. Explain in brief :
 - a. Accumulator machine
 - b. Stack machine
5. Explain components of instruction cycle.
6. Discuss PC relative and Base register addressing mode

SECTION-C

7. Explain various stages in instruction pipelining. Discuss in detail methods to handle Data hazards.
8. Explain below page replacement algorithms with examples :
 - a. FIFO
 - b. LIFO
 - c. Least recently used
 - d. Optimal Page replacement
9. Give the hardware organization of associative memory. Why associative memory is faster than other memories? Deduce the logic equation used to find the match in the associative memory.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

SECTION-B

2. What is Relational Model? Discuss various features of Relational Model.
3. List various advantages of Data Base approach over Traditional File system approach.
4. Explain the different set operations used in SQL.
5. What are Multimedia Databases? How data is stored and indexed in Multimedia Databases?
6. What are Data Warehouses? Explain the meaning of Extraction, Transformation and Load in perspective of Data warehouses.

SECTION-C

7. Explain XML with the help of an example.
8. What do you mean by Normalization? Explain the first three normal forms along with BCNF and the anomalies that exist in these normal forms with the help of suitable examples.
9. What is meant by concurrent by the concurrent execution of Database Transactions in a multi user system? Discuss the different problems that can occur due to concurrent execution of transactions. Explain with the help of an example of the terms - Serial Schedule and Serializable Schedule.

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SECTION-B

2. Explain different algorithms of Encryption.
3. Describe various regulators under IT Act.
4. Write short notes on :
 - a. Cyber Crime Offences
 - b. Use of IPR
5. What are different components of Cyber laws? Write briefly.
6. What are the different E-Commerce Models in Digital Society?

SECTION-C

7. What is the role of Network Security in today's Cyberspace era? Explain measures for it.
8. Why Patents are considered so important in digital era of products? Which inventions are not patentable? What is the process of patent filing?
9. Discuss the history, aim, scope and commencement of IT Act.

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B.Tech.(IT) (2012 to 2017) (Sem.-5)
SYSTEM ANALYSIS AND DESIGN
Subject Code : BTIT-501
M.Code : 70594

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) List various components of a system.
- b) Distinguish between manual and automated systems.
- c) Explain in brief about system development life cycle.
- d) Write two advantages of site visits technique for data and fact gathering.
- e) What is the purpose of testing?
- f) Explain the term Module Specifications.
- g) What is the difference between a flow chart and a data flow diagram?
- h) What is need of system maintenance?
- i) Explain the term audit of computer system usage.
- j) Explain in brief about State Diagram.

SECTION-B

2. Explain briefly the qualifications and responsibilities of a system analyst.
3. Explain in brief about principles of systems documentation.
4. Explain various types of feasibility studies that the analyst should consider.
5. Discuss the various procedures and norms for utilization of Computer equipment.
6. Explain in brief about object modeling.

SECTION-C

7. Define system. How system is different from sub-system? Explain characteristics and types of system.
8. Describe the concept and procedure used in constructing DFDs. Use an example of your own to illustrate.
9. Discuss the case study for developing prototype for Hospital management system.

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Total No. of Pages : 02

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B.Tech.(IT) (2012 to 2015) Sem.-6)

INFORMATION SECURITY AND RISK MANAGEMENT

Subject Code : BTIT-602

M.Code : 71172

Max. Marks : 60

Time : 3 Hrs.

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1) Answer briefly :

- a) What is a one way function?
- b) Name three broad categories of applications of public key cryptosystem.
- c) What are key principles of security?
- d) What is a public key certificate?
- e) What are the properties a digital signature should have?
- f) Why does PGP generate a signature before applying compression?
- g) What protocols comprise SSL?
- h) What is threat assessment?
- i) What is Information Security Life Cycle?
- j) What are IPSec protocols?

SECTION-B

- Q2) Using $e = 13$, $d = 37$, and $n = 77$ in the RSA algorithm, encrypt the message "GOOD" using the values of 00 to 25 for letters A to Z. For simplicity, do the encryption and decryption character by character.
- Q3) What requirements must a public-key cryptosystem fulfill to be a secure algorithm?
- Q4) What is message Integrity? What are the different ways of preserving the integrity of a document?
- Q5) What are various types of malicious programs? Explain various types of Viruses.
- Q6) Comment on the differences between MD4 and MD5. Specifically, to what extent do you think that MD5 is stronger than MD4, and why?

SECTION-C

- Q7) In Secure Socket Layer (SSL) and Transport Layer Security (TLS), why is there a separate Change Cipher Spec Protocol, rather than including a change_cipher_spec message in the Handshake Protocol?
- Q8) What is message authentication? What types of attacks are addressed by message authentication? List some approaches to producing message authentication. In what ways can a hash value be secured so as to provide message authentication?
- Q9) Explain various modes of Risk Analysis.

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SECTION-B

2. What are the properties of FIFO and Pipe?
3. Differentiate between Posix message queues and System V message queues.
4. Brief the way in which TCP client server is different from UDP client server.
5. Explain XNS.
6. Write a note on System V transport layer.

SECTION-C

7. Write briefly POSIX Signal Handling and Termination of Server Process.
8. What is I/O Multiplexing? Explain different types of Synchronous and asynchronous I/O models.
9. Describe the UDP Echo server functions and lost datagram with an example.

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Total No. of Questions : 09

B.Tech.(IT) (2012 to 2017) (Sem.-6)

WEB TECHNOLOGIES

Subject Code : BTIT-603

M.Code : 71173

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Explain in brief about the term HTTP.
- b) Explain the term URLs in brief.
- c) How to declare HTML5 forms?
- d) What are the types of list supported by HTML5?
- e) Which java script operator calculates the remainder by dividing two integers? Explain with an example.
- f) What are the advantages of JavaScript?
- g) What are the different operators available in PHP?
- h) How comments are given in PHP code?
- i) Explain the advantages of Java servlets.
- j) Explain the advantages of JSP.

SECTION-B

2. Write a brief note on Web browsers and web servers.
3. Write a detailed note on HTML5 forms.
4. Explain in detail about XMLHttpRequest.
5. What is PHP? What are the common usages of PHP? Also explain the characteristics of PHP variables.
6. Explain in detail about JavaScript DOM.

SECTION-C

7. Write a detailed note on different type of operators available in JavaScript.
8. Write a detailed note on the following :
 - a) Types of Internet Connections
 - b) Cascading Style Sheets in HTML5
9. Write a detailed note on following :
 - a) J2EE
 - b) JSP

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B.Tech. (IT) (E-I 2012 to 2017) (Sem.-6)

CLOUD COMPUTING

Subject Code : BTCS-912

M.Code : 71179

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Difference between elasticity and scalability in cloud computing.
- b) Service-Oriented Architecture (SOA).
- c) Utility Computing.
- d) Public/Private Key concept.
- e) Virtual Machine.
- f) Digital signature.
- g) Secure Sockets Layer (SSL).
- h) Hybrid Cloud
- i) Big Data Cloud
- j) VM Migration

SECTION-B

2. Define Cloud Computing. What are the Characteristics of cloud computing?
3. Define and Explain Cloud Computing Reference model with suitable diagram.
4. Explain the different types of Hardware Virtualization Techniques.
5. What are the benefits of virtualization using in Cloud Computing?
6. What are the advantages of "Platform as a Service" (PaaS)? Explain with example.

SECTION-C

7. Describe the Google AppEngine Architecture and core concepts.
8. What pros and cons of Public vs. Hybrid cloud?
9. What different techniques are used for data encryption in Cloud Computing?

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B.Tech.(IT) (2012 to em.-7)
BUILDING ENTERPR CATIONS

Subject Code : BTIT-701

M.Code : 71979

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

1. Write briefly :

- a) Enterprise analysis
- b) XML
- c) Protocol
- d) Deployment
- e) Code profiling
- f) Integration Testing
- g) Penetration Testing
- h) Static code analysis
- i) Estimation
- j) Levels of testing

SECTION-B

2. What do you mean by software engineering methodologies? Explain life cycle of enterprise.
3. Define inception of enterprise applications and enterprise analysis.
4. Explain the concept of enterprise architecture.
5. Write a note on dynamic code analysis.
6. What are various types of testing? Explain.

SECTION-C

7. Describe software construction maps.
8. Discuss in detail interface testing and user acceptance testing.
9. What are the key determinants of successful enterprise applications?

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B.Tech.(IT) (2012 to 2017) (Sem.-7)
BUILDING ENTERPRISE APPLICATIONS
Subject Code : BTIT-701
M.Code : 71979

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.

SECTION-A

I. Write briefly :

- a) Enterprise analysis
- b) XML
- c) Protocol
- d) Deployment
- e) Code profiling
- f) Integration Testing
- g) Penetration Testing
- h) Static code analysis
- i) Estimation
- j) Levels of testing

SECTION-B

2. What do you mean by software engineering methodologies? Explain life cycle of enterprise.
3. Define inception of enterprise applications and enterprise analysis.
4. Explain the concept of enterprise architecture.
5. Write a note on dynamic code analysis.
6. What are various types of testing? Explain.

SECTION-C

7. Describe software construction maps.
8. Discuss in detail interface testing and user acceptance testing.
9. What are the key determinants of successful enterprise applications?

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B.Tech.(IT) (2012 to 2017) (Sem.-7)
SOFTWARE PROJECT MANAGEMENT
Subject Code : BTIT-702
M.Code : 71980

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a. Software Risk
- b. Project Characteristics
- c. CMMI
- d. Project Stakeholders
- e. Strategic planning in Software Project Management
- f. Contract Management
- g. Project Breakdown Structure
- h. Test Automation
- i. ISO/IEC 12207
- j. Change control

SECTION-B

2. What are the various factors considered for organizing software team? How do the Project manager assign task to individuals?
3. What is the role of stress, health and safety in software project management?
4. What are the different factors that cause changes in software? How do change control works?
5. How Risk Management is important in software project management? Explain its nature and types.
6. What are the various processes involved in Software Project Management?

SECTION-C

7. Compare CMMI and ISO models for software quality in detail. How do they help to control the quality of the software?
8. Describe various organizational and management issues for a software product.
9.
 - a. Explain Project closing process.
 - b. What are the various methods of Requirement Identification and collection?

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B.Tech.(IT) (2012 to 2017 E-III) (Sem.-7)
ENTERPRISE RESOURCE PLANNING
Subject Code : BTCS-916
M.Code : 71992

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Define the following :

- a. Need of business intelligence.
- b. Advantages of E-commerce.
- c. Name the various ERP implementation strategies.
- d. Advantages of data migration.
- e. How the performance of ERP model be maximized?
- f. Applications of materials management.
- g. Name various organizations/companies that use SAP.
- h. Components of Lawson software.
- i. Features of ERP II.
- j. Latest trends in ERP.

SECTION-B

2. Justify the status of ERP scenario in India.
3. Discuss the ERP Inventory Control Module in detail. Give suitable example.
4. Differentiate between conventional application packages and ERP packages.
5. How Oracle Corporation specializes in developing and marketing enterprise software products?
6. Why SAP AG is one of the largest European software enterprises in the world?

SECTION-C

7. *“The Quality Management System (QMS) within Enterprise IQ provides a systematic approach to meeting the quality needs of manufacturers. Enterprise IQ Quality Management System provides a comprehensive set of tools and capabilities necessary to ensure customer satisfaction and compliance with the most stringent quality standards including automotive, medical and ISO standards”*. Justify.
8. Discuss various ERP modules. Explain the various parameters of materials management in ERP system.
9. Discuss the various responsibilities of ERP vendors.

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