



# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CE2101

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

PROBABILITY AND STATISTICS

(CE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

## PART-A

1. (a) State Baye's theorem.
- (b) Find the mean and variance of Gamma distribution.
- (c) A random sample of size 100 is taken from an infinite population having the mean  $\mu=76$  and the variance  $\sigma^2=256$ . What is the probability that  $\bar{x}$  will be between 75 and 78 ?.
- (d) Write the formulas for hypothesis concerned in one mean and difference of two means.
- (e) What are regression lines and explain it.
- (f) What is control chart ? Name the types of control charts.

[2+2+2+2+2+2]

## PART-B

4 X 12 = 48

2. (a) Suppose that the probabilities are 0.4 , 0.3, 0.2 and 0.1 that there will be 0, 1, 2 or 3 power failures in a certain city during the month of July. Use the formulas which define  $\mu$  and  $\sigma^2$  to find
  - i) the mean of this probability distribution;
  - ii) the variance of this probability distribution.
- (b) In the inspection of tin plate produced by a continuous electrolytic process, 0.2 imperfection is spotted on the average per minute. Find the probabilities of spotting
  - i) one imperfection in 3 minutes;
  - ii) at least two imperfections in 5 minutes;
  - iii) at most one imperfection in 15 minutes.
3. Find the probabilities that a random variable having the standard normal distribution will take on a value
  - i) between 0.87 and 1.28 ;
  - ii) between - 0.34 and 0.62 ;
  - iii) greater than 0.85 ;
  - iv) greater than - 0.65.

4. A random sample of size 25 from a normal population has the mean  $\bar{x} = 47.5$  and the standard deviation  $s = 8.4$ . Does this information tend to support or refuse the claim that the mean of the population is  $\mu = 42.1$  ?.
5. A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of  $n_1 = 40$  of its bulbs has a mean lifetime of 647 hours of continuous use with a standard deviation of 27 hours, while a sample of  $n_2 = 40$  bulbs made by its main competitor had a mean lifetime of 638 hours of continuous use with a standard deviation of 31 hours, does this substantiate the claim at the 0.05 level of significance ?.
6. The following data pertain to the cosmic ray doses measured at various altitudes :

Altitude (feet) x :	50	450	780	1200	4400	4800	5300
Dose rate (mrem/year) y	28	30	32	36	51	58	69

- i) Fit an exponential curve.
- ii) Use the result obtained in part (i) to estimate the mean dose at an altitude of 3000 feet.
7. The following data give the average life in hours and range in hours of 12 samples each of 5 lamps. Construct the control charts for  $\bar{X}$  and R and comment on the state of control.

$\bar{X}$	120	127	152	157	160	134	137	123	140	144	120	127
R	30	44	60	34	38	35	45	62	39	50	35	41

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**Subject Code: R16CE2102**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**BUILDING MATERIALS AND CONSTRUCTION  
(CE)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. (a) List out the composition of materials of good brick earth.
- (b) What is the necessity of seasoning? Mention any two defects if seasoning is not done for the fresh timber.
- (c) Define workability of concrete and list out the various tests for fresh concrete.
- (d) Define the term key in arch and mention importance of arch.
- (e) Briefly explain cantilever scaffolding.
- (f) Differentiate between shallow and deep foundations.

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Differentiate between Clamp burning and Kiln burning.
- (b) Explain in detail the method of blasting for quarrying of stones with neat sketch.
3. (a) Write any two advantages of English bond over Flemish and draw the sketches for section and elevation of English bond for 1 brick thickness neatly.
- (b) Explain the various defects of timber due to natural forces.
4. (a) Explain briefly the intermittent kiln procedure for manufacturing of lime with sketch.
- (b) What is meant by hydration? Explain any four types of cements and mention their use in field.
5. (a) What are the various types of pitched roofs explain with neat sketches?
- (b) Draw the neat sketch of Queen post truss and explain where it is used with advantages.
6. (a) Explain the necessity of damp proofing? List out and explain various damp proofing materials.
- (b) Explain formwork and its importance? Mention the precautions that should be taken care about formwork?
7. (a) Explain mat and pile foundations and mention the choice of suitability of these foundations in field.
- (b) What are the functions of foundation and mention on what basis the depth of foundation is chosen?





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Subject Code: R16CE2103

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

**BUILDING PLANNING AND DRAWING**

(CE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answer any Three questions from Part-A

Answer One Question from Part-B

**PART-A**

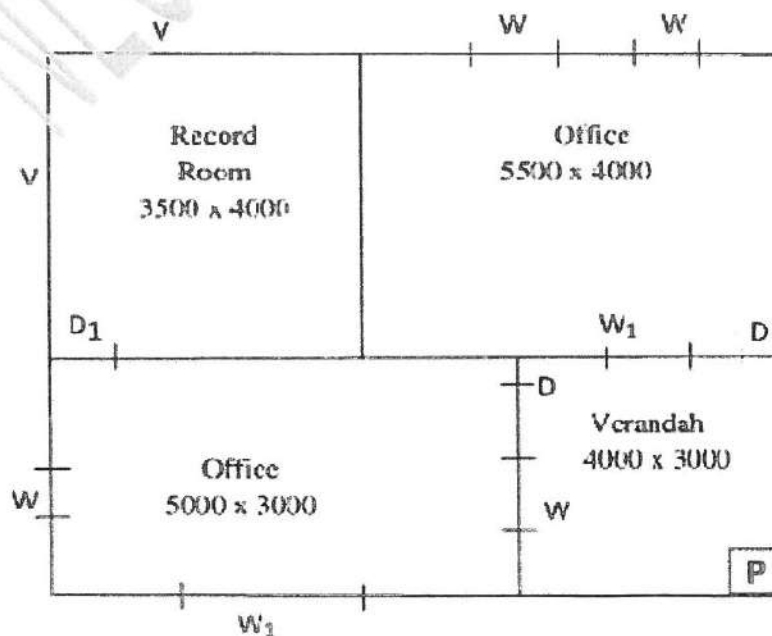
12 X 3 = 36

1. What are building Bye-Laws and what are its objectives?
2. What are the purpose and requirements for the following rooms in planning of a Residential building?
  - i) Drawing Room
  - ii) Kitchen
3. Explain the planning standards of banks and hospitals.
4. a) What are the essential features of an English bond?  
b) Draw a neat sketch of a 2 brick wall for an English bond?
5. a) Describe the concept of built up area and its limitations.  
b) Explain the lightening and ventilation requirements.

**PART-B**

24 X 1 = 24

6. a) Sketch the details of a panelled door and panelled window.  
b) Draw the conventional signs for Rock, Timber, Stone and glass in 40mm x 40mm blocks.
7. From the given line diagram with specifications draw the plan and section of singly storied office building. Assume suitable data for the foundation, doors, windows and wall thickness in super structure as per norms.







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**Subject Code: R16CE2104**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**SURVEYING - I**

**(CE)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

**Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.**

**PART-A**

1. (a) Differentiate between plane surveying and geodetic surveying.
- (b) Briefly explain about optical square.
- (c) What is meant by local attraction and mention the reasons for local attraction?
- (d) Define curvature and refraction corrections.
- (e) What is meant by contour grade?
- (f) What is the importance of orientation while doing plane table surveying?

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) What are the principles of surveying and briefly explain about EDMs?
  - (b) List out the various tape corrections. Find the true area of a rectangular plot was measured with a 20m chain 12cm too long. The lengths of the sides were recorded as 260m and 440m.
3. Explain in detail the various errors in chain surveying and their precautions.
4. (a) The following bearings were observed in running a closed traverse.

LINE	Fore Bearing	Back Bearing
AB	75°5'	254°20'
BC	115°20'	296°35'
CD	165°35'	345°35'
DE	224°50'	44°5'
EA	304°50'	125°5'

At what stations do you suspect the local attraction? Determine the correct magnetic bearings. If the declination was 5°10'E. What are the True bearings?

- (b) What is meant by closing error? Explain Bowditch's graphical method to adjust the closing error in a closed traverse.

5. (a) The following readings were taken during a levelling operation: 2.495; 1.185; -2.365; 0.195; 1.805; 1.575; 0.905. The instrument was shifted after fourth reading. The negative reading was taken with the staff inverted from a point below a sunshade. Find the reduced levels of all the points using 'Height of collimation method'. If the first reading was taken at a point (bench mark) of known R.L. 100.00m.

(b) Explain in detail the procedure of reciprocal levelling and mention where it is used?

6. (a) Explain any two indirect methods of locating contours.

(b) Explain any three characteristics of contour and also explain the procedure of determining the reservoir capacity using contour plan.

7. (a) Explain radiation method of plane table surveying and write the advantages of this method over intersection method.

(b) Explain the use of alidade and compass in plane table surveying and explain the methods of orienting the plane table.

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**Subject Code: R16CE2105**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**FLUID MECHANICS  
(CE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) Define density, specific weight, specific volume and specific gravity of a fluid.  
(b) Explain the gauge, vacuum and absolute pressure.  
(c) Explain the difference between steady and unsteady flow with examples.  
(d) What are the assumptions in the derivation of Bernoulli's equation?  
(e) Define orifice and mouthpiece. What is the difference between the two?  
(f) What are the various minor losses in pipe flow?

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Explain the Newton's law of viscosity.  
(b) A hydraulic lift consists of a 280 mm diameter ram which slides in a 280.22 mm diameter cylinder, the annular space being filled with oil having a kinematic viscosity 4.2 stokes and specific gravity of 0.86. If the rate of travel of the ram is 22 cm/sec, find the frictional resistance when 2m of the ram is engaged in the cylinder.
3. (a) Explain the different types of manometers  
(b) A triangular plate of height 2.4m and base 1.5m is submerged in an oil of specific gravity 0.85 in such a way that its plane makes an angle of  $45^\circ$  with the free surface of the oil. The base of the plate is parallel to the oil surface and at a depth 1.2m below the oil surface. Find the total pressure force on the plate and the position of centre of pressure.
4. (a) Define stream function and velocity potential function. Show that lines of constant stream function and velocity potential must intersect orthogonally...  
(b) A conical pipe 10cm inlet diameter, 40cm outlet diameter and 2m long is placed horizontally. Find the total acceleration at a section where the diameter is 20cm for a constant flow of  $0.2 \text{ m}^3/\text{sec}$ .
5. (a) The water is flowing through a pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end, at the rate of 50 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher end is  $19.62 \text{ N/cm}^2$ .  
(b) Derive the expression for the discharge through the venturimeter. Also explain its working with a neat sketch.

6. (a) Define coefficient of velocity, coefficient of contraction and coefficient of discharge. Also obtain the relation between them.

(b) Water flows over a trapezoidal notch which is 1m wide at the top, 0.6m at the bottom and 0.5m in height. If the height of water above the crest is 0.3m, find the discharge over the weir. Take coefficient of discharge as 0.6.

7. (a) Derive Darcy-Weisbach equation for head loss due to friction in a pipe.

(b) Water is flowing through a horizontal pipe of 50cm diameter and of length 1000m. One end of the pipe is connected to a tank and the other end is open to atmosphere. The height of the water in the tank is 50 cm above the centre of pipe. Find the discharge through the pipe. If another parallel pipe of the same diameter is introduced in the second half of its length; find the percentage of increase in discharge. Take friction factor  $f=0.03$

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CE2106

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

## MECHANICS OF SOLIDS

(CE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

### PART-A

- (a) Plot a tensile test diagram for steel with its salient features.  
(b) Define principal planes and principal stresses.  
(c) Write the relationship between load intensity, bending moment and shear force.  
(d) Define section modulus.  
(e) What is a strut? How does it differ from column?  
(f) What do you mean by torque?

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

- (a) Derive the relation between modulus of elasticity and bulk modulus.  
(b) A 300 mm long steel tube of 100 mm internal diameter and 10 mm thick is surrounded closely by a copper tube of same length and thickness of 20 mm. The total assembly carries an axial load of 120 kN. Calculate the load carried by each tube.  $E_s = 0.21 \text{ MN/m}^2$   $E_c = \text{MN/m}^2$
- (a) Explain any three theories of failure.  
(b) At a certain point in a strained material, the intensities of normal stresses on two planes at right angles to each other are  $120 \text{ N/mm}^2$  (tensile) and  $80 \text{ N/mm}^2$  (compressive). They are accompanied by shear stress of  $50 \text{ N/mm}^2$ . Find the principal planes and principal stresses. Also find the maximum shear stress.
- A simply supported beam of 7m length carries a point load of 10 kN at the right end and a uniformly distributed load of 30 kN/m for a distance of 3m starting from left end. The supports of the beam are 5m apart, the left end support being at the left end. Draw the shear force and bending moment diagrams indicating salient values.
- (a) Prove that the maximum shear stress in a rectangular section of a beam is  $3/2$  times the average shear stress.  
(b) A cast iron bracket of I- section has its top flange as 120mm x 40mm, bottom flange as 200mm x 40mm and the web as 300mm x 40mm. The overall depth of the section is 380mm. The bracket is subjected to bending. If the maximum tensile stress in the top flange is not to exceed 15MPa, determine the maximum bending moment that the section can take. Also find the corresponding compressive stress in the bottom flange.

6. (a) Derive the expression for Euler's crippling load for a long column when both ends are hinged. What are the assumptions made in Euler's column theory?

(b) A 5m long hollow cast iron column with fixed ends supports an axial load of 800kN. The external diameter of the column is 240mm. Determine the thickness of the column using Rankine formula with a constant of  $1/6400$ . The working stress is 80 MPa.

7. A hollow shaft having an internal diameter 60% of external diameter transmits 300kW power at 160 rpm. Determine the external and internal diameters of the shaft if the shear stress is not to exceed  $60\text{N/mm}^2$  and twist in a length of 3m should not exceed 1.5 degrees. Assume maximum torque is 40% more than the mean torque and modulus of rigidity as  $9 \times 10^4 \text{N/mm}^2$ .

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Subject Code: R16EE2101

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

ELECTRICAL CIRCUIT ANALYSIS - II

(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

## PART-A

- (a) What is the significance of phase sequence.  
(b) Why is it not possible for the current in an inductor to change instantaneously?  
(c) Define time constant and write its significance.  
(d) Why Z-parameters are known as open circuit parameters  
(e) What do you mean by propagation constant?  
(f) Define line spectra and phase angle spectra.

[2+2+2+2+2+2]

## PART-B

4 X 12 = 48

- (a) In a three phase balanced load, each arm consists of a resistor of  $10\Omega$ , an inductance of  $0.6H$  and a capacitor of  $130\mu F$  connected in series. The supply is a balanced 3-phase  $400V$ ,  $50$  Hz. Calculate the line current, total power consumed in the load when the three arms are connected in star and delta.  
(b) Show that power consumed by three identical phase loads connected in delta is equal to three times power consumed when phase loads are connected in star.
- (a) Explain the Loop method to solve the three phase unbalanced circuits  
(b) The two-wattmeter method gives  $P_1=1200W$  and  $P_2=-400W$  for a three-phase motor running on a  $240V$  line. Assume that the motor load is star connected and that it draws a line current of  $6A$ . Calculate the power factor of the motor and its phase impedance.
- (a) Analyze the transient response of R-C series network with A.C excitation?  
(b) Find the current in a series R-L circuit having the resistance of  $2\Omega$  and inductance of  $10H$  while a DC voltage of  $100V$  is applied. What is the value of current in the circuit after 5 seconds?
- (a) Derive the hybrid parameters of a 2-port network?  
(b) Two 2-port networks A and B are connected in parallel. Each of these networks has their own Y-parameters. Show that resultant Y-parameters of the combined parallel network is sum of Y-parameters of the individual networks A and B.
- (a) What is a Filter ? Describe the classification of filters  
(b) Design m-derived T type low pass filter to work into load of  $500\Omega$  and cut-off frequency at  $4$  kHz and peak attenuation at  $4.5$  kHz.
- (a) Explain about the trigonometric form of Fourier series.  
(b) Discuss the properties of Fourier transform.

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Subject Code: R16EE2102

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**ELECTRONIC DEVICES AND CIRCUITS  
(EEE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. (a) Define intrinsic and extrinsic semiconductors.
- (b) Write diode current equation and explain about the reverse saturation current.
- (c) Give the theoretical values for ripple factor and efficiency of bridge rectifier.
- (d) What is early effect?
- (e) Define the stability factor and thermal runaway.
- (f) List the applications of UJT

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) Explain the semiconductors, insulators and metals classification using energy band diagrams. [6M]
- (b) Explain the principle of Hall Effect with diagram and write its applications [6M]
3. (a) Explain the working of PN junction diode in forward and reverse bias conditions. [6M]
- (b) Derive an expression for Transition and Diffusion capacitances of a PN junction diode? [6M]
4. (a) Explain the construction and working of Tunnel diode.
- (b) Explain the construction and working of LCD. [6M]
5. (a) Explain input and output characteristics of common emitter configuration. [8M]
- (b) Compare CE, CB and CC configurations [4M]
6. (a) What is Biasing? Explain the need of it? List the different types of biasing methods. [6M]
- (b) Derive an expression for stability factor of self-bias circuit. [6M]
7. (a) Explain in detail the working of JFET and draw its drain and transfer characteristics. [6M]
- (b) Explain about Construction, Operation and Characteristics of UJT? [6M]

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Subject Code: R16EE2103

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**ELECTRO MAGNETIC FIELDS  
(EEE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

- (a) Write down the statement of coulomb's law.  
(b) Define polarization in dielectric materials.  
(c) State ampere's circuital law and write its applications.  
(d) Define self-inductance and mutual inductance.  
(e) Write the expression for force on a differential current element in magnetic fields.  
(f) Write Maxwell's equations for time varying fields.

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

- (a) State and prove Gauss's law.  
(b) A charge of  $0.5\mu\text{C}$  is located at A (30, -25, 15) cm and a second charge of  $0.8\mu\text{C}$  is located at B (12, -8, 10) cm. Find the electric field strength at i) origin ii) point P (15, 20, 50) cm.
- (a) Derive the expressions for potential and electric field intensity due to a dipole.  
(b) Determine the capacitance of a capacitor consisting of two parallel metal plates  $30\text{ cm} \times 30\text{ cm}$ , surface area, separated by 5mm in air. What is the total energy stored by the capacitor if the capacitor is charged to a P.D. of 500 V? What is the energy density?
- (a) Derive the equations for Magnetic Field Intensity of Circular and Solenoid current carrying wire.
- (a) Explain the concept of vector and scalar magnetic potentials.  
(b) A coil of 1 mH is magnetically coupled to another coil of 500  $\mu\text{H}$ . The coefficient of coupling between two coils is 0.015. Calculate the inductance, if these two coils are connected in series addition and series opposition.
- (a) Find the force on a straight and long current carrying conductor in a magnetic field.  
(b) Derive the expression for force between two straight long and parallel current carrying conductors.

7. (a) State and explain about Faraday's law and also derive the expressions for statically and dynamically induced emf's.

(b) A conductor with cross sectional area of  $10\text{cm}^2$  carries a conduction current  $0.2\sin 10^9t$  mA. Given that  $\sigma = 2.5 \times 10^6$  S/m and  $\epsilon_r=6$ , Calculate the magnitude of the displacement current density.

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**Subject Code: R16EE2104**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**FLUID MECHANICS AND PRIME MOVERS  
(EEE)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

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**PART-A**

1. (a) Define and distinguish between specific weight and mass density.
- (b) Define streamlines and streaklines.
- (c) What are major and minor losses.
- (d) Define mechanical efficiency and hydraulic efficiency.
- (e) What is the function of draft tube in Francis turbine.
- (f) Distinguish between rotational and irrotational flow.

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) Explain absolute pressure, gauge pressure, vacuum pressure.
- (b) The right limb of a U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe through which flows a fluid of specific gravity 0.85. The centre of pipe lies 15cm below the level of mercury in the right limb. If the difference of mercury level in two limbs is 25cm, determine the pressure of fluid of the pipe.
3. (a) Derive the one dimensional continuity equation.
- (b) 250 litres per second of water is flowing in a pipe having a diameter of 30cm. If the pipe is bent by  $135^\circ$ , find the magnitude and direction of resultant force on the bend. The pressure of water flowing in the pipe is 400kPa.
4. (a) Derive an expression for head loss at sudden expansion in pipe flows.
- (b) Find the discharge of water flowing through a pipe 30cm diameter placed in an inclined position where a venturimeter is inserted, having a throat 15cm. The difference of pressure between the main and the throat is measured by a liquid of specific gravity 0.6 in an inverted U-tube which gives a reading of 30cm. The loss of head between the main and the throat is 0.2 times the kinetic head of the pipe.

5. (a) Derive the expression for jet impingement upon a stationary flat plate.  
(b) A jet of water, 10cm diameter and having a velocity of 15m/s impinges at the centre of a hemispherical vane. The linear velocity of the vane is 5m/s in the direction of jet. Find the force exerted on the vane. How this force would change if the jet impinges on series of vanes attached to the circumference of the wheel ?
6. (a) In case of Pelton wheel, two hemispherical cups are joined together and water is directed to the junction, what is the advantage of this arrangement.  
(b) A Francis turbine works at 450 rpm under a head of 120 meters. Its diameter at inlet is 120 cm and the flow area is  $0.4 \text{ m}^2$ . The angles made by the absolute and relative velocities at inlet are  $20^\circ$  and  $60^\circ$  respectively with tangential velocity. Determine (i) The volume flow rate (ii) the hydraulic power developed and (iii) the efficiency. Assume whirl at outlet to be zero.
7. (a) Explain flow duration curve.  
(b) Two turbo generators each of capacity 25000 kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000 kW to 40000 kW. Calculate total installed capacity, the load factor, the plant factor, the utilization factor.

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Subject Code: R16EE2105

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

## COMPLEX VARIABLES AND STATISTICAL METHODS

(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

### PART-A

- (a) Find where the function  $w = \frac{z}{z-1}$  ceases to be analytic.  
(b) State Cauchy's integral theorem.  
(c) Find zeros of  $f(z) = \sin z$ .  
(d) A die is thrown 8 times. What is the probability that 3 will show exactly 2 times?  
(e) A sample of size 64 is taken from a population whose variance is 2 with probability 0.99. Then the maximum error.  
(f) Define one-tailed and two-tailed tests.

[2+2+2+2+2+2]

### PART-B

4X 12 = 48

- (a) Find  $k$  such that  $f(x, y) = x^3 + 3kxy^2$  may be harmonic and find its conjugate. [7M]  
(b) Find all values of  $k$ ,  $f(x) = e^x(\cos ky + i \sin ky)$  is analytic. [5M]
- Verify Cauchy's theorem for the function  $f(z) = 3z^2 + iz - 4$ . If  $C$  is the square with vertices at  $1 \pm i$  and  $-1 \pm i$ . [12M]
- (a) Find the residue of  $f(z) = \frac{z^3}{(z-1)^4(z-2)(z-3)}$  at  $z=1$ . [6M]  
(b) Evaluate  $\int_C \frac{(2z+1)^2}{4z^3+z} dz$  where  $C$  is the circle  $|z|=1$  Use Residue theorem. [6M]
- (a) For the continuous probability function  $f(x) = kx^2 e^{-x}$  when  $x \geq 0$ , find (i)  $k$  (ii) Mean (iii) Variance. [7M]  
(b) Derive the variance of Poisson distribution. [5M]
- (a) Samples of size 3 are taken from the population 3, 6, 9, 15, 27 without replacement. [6M]  
Find I) The mean of the population  
II) The S.D of the population  
III) The mean of the sample distribution of means  
IV) The S.D of the sample distribution of means  
(b) The mean Voltage of a battery is 15 and S.D is 0.2. Find the probability that four such batteries connected in series will have a combined voltage of 60.8 or more volts. [6M]

7. (a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38 at 95% confidence level. **[6M]**
- (b) The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches. **[6M]**



**Subject Code: R16EE2106**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**ELECTRICAL MACHINES - I  
(EEE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

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**PART-A**

1. (a) What is energy balance equation?
- (b) Draw internal and external characteristics of shunt and series generator.
- (c) What do you mean by “back emf” in DC Machine and write its significance.
- (d) Define all-day efficiency of a transformer? What is its significance?
- (e) What are the necessary conditions for parallel operation of transformer?
- (f) Why tapings are on HV side in a tap changing transformer?

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) Draw and explain fully the general block diagram representation of an electromechanical energy conversion device.
- (b) Explain about demagnetizing Ampere turn per pole and Cross magnetizing Ampere Turn per pole.
3. (a) Explain open circuit characteristics of DC generator and also explain how to find critical field resistance of DC generator.
- (b) A 10 kW, 250 V DC shunt generator has total no-load rotational loss of 400 W. The armature circuit resistance and shunt field resistances are  $0.5 \Omega$  and  $250 \Omega$  respectively. Calculate the shaft power input and the efficiency at rated load?
4. (a) Explain the construction and operation of 3-point starter used for starting of DC motor?
- (b) The following results are obtained during Hopkinson’s test on two similar 230V machines armature currents are 37A and 30A. Field currents are 0.85A and 0.8A calculate the efficiencies of the machines if each has an armature resistance of  $0.33\Omega$ .
5. (a) What is voltage regulation of a transformer? Derive the conditions for maximum and zero voltage regulation in a transformer.
- (b) A transformer has resistance and reactance drop of 2.5% and 5% respectively. Find the percentage voltage regulation of the transformer at full load and at 0.8 p.f lagging. Also find the power factor at which regulation is maximum.

6. (a) Explain the procedure to conduct the Sumpner's test and obtain the different circuit parameters to estimate the performance of the transformer.
- (b) A 400/100 V, 5 kVA single-phase two winding transformer is to be used as an auto transformer to supply 400 V from 500 V voltage source. When tested as a two winding transformer at rated load and 0.8 pf lagging, its efficiency was found to be 94%. Find its efficiency as an auto transformer at rated load and 0.85 pf lag.
7. (a) Explain about the star-star, star-delta and delta-star connections used in 3-phase connection of transformers. Discuss their advantages and disadvantages.
- (b) A balanced 3-phase, 100 kW load at 400V and 0.8 p.f. lag is to be obtained from a balanced 2-phase, 1100V lines. Determine the kVA rating of each unit of the Scott-connected transformer.

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2101

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

## PART-A

1. (a) State Ohm's Law
- (b) Give some applications of DC motor
- (c) What is the principle of operation of a transformer
- (d) Define slip
- (e) What is a transistor?
- (f) What is an amplifier?

[2+2+2+2+2+2]

## PART-B

4 X 12 = 48

2. (a) The effective resistance of two resistors connected in series is 100. When connected in parallel, then effective value is 24 ohm's. Determine the value of two resistors
- (b) Explain the relation between voltage, current and resistance
3. (a) Derive EMF equation of a DC generator.
- (b) A 100-kW, 250-V DC shunt generator has an armature resistance of 0.05 ohm and field circuit resistance of 60 ohm, determine the induced voltage at (a) full load, and (b) half load
4. (a) An 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary.
- (b) Explain the working principle of Transformer with neat diagram.
5. (a) Explain the working principle of three phase induction motor.
- (b) Describe how regulation of an alternator can be obtained by synchronous impedance method
6. (a) What are various types of transistors and their advantages.
- (b) Compare conductors, semiconductors and insulators.
7. (a) What is an OP-AMP? Discuss its applications in inverting mode of operation.
- (b) With a neat diagram, discuss operation of differentiator

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Subject Code: R16ME2102

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**MECHANICS OF SOLIDS**

**(ME)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) Why nominal breaking stress is less than the ultimate strength as obtained from uniaxial tensile test of a ductile material?
- (b) Define Shear force diagram and bending moment diagram
- (c) Draw shear stress distribution for rectangle section
- (d) Why I section is preferred out of all the cross sections in structural applications
- (e) What methods are used to reduce the maximum hoop stress occurred in thick cylinders subjected to high internal fluid pressure?
- (f) Write the limitations of Euler's formula

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) A tensile test was conducted on a mild steel bar. The following data was obtained from the test:  
Diameter of the steel bar = 20 mm; Gauge length of a bar = 150 mm; Load at the elastic limit = 200 kN;  
Extension at a load of 100kN = 0.2 mm; Maximum load = 300 kN; Total extension = 50 mm; Diameter of the rod at the failure = 12.5 mm;  
Determine i) Young's modulus, ii) Stress at the elastic limit, iii) Ultimate stress, iv) Percentage elongation and v) Percentage decrease in area (7M)
- (b) A steel rod 100mm in diameter and 2.5m long is subjected to a suddenly applied pull of 400kN. Determine the strain energy if  $E = 200 \text{ kN/mm}^2$  (5M)
3. A beam 8m long is symmetrically supported over a 4m span. The overhanging ends at the left and right carry point loads of 60 kN and 40 kN respectively, while the length between supports carries a uniformly distributed load of 20 kN/m. Draw the shear force and bending moment diagrams (12M)
4. (a) Derive the equation from the theory of simple bending (8M)  
$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$
- (b) A circular beam of 100mm diameter is subjected to a shear force of 5kN. Calculate Average shear stress and Maximum shear stress. (4M)
5. What is Macaulay's method? Where it is used? Find the expression for deflection at any section of a simply supported beam with an eccentric point load using Macaulay's method (12M)

6. A steel cylinder of 200 mm external diameter is to be shrunk onto another steel cylinder of 60 mm internal diameter. The diameter at the junction after shrinking is 120 mm. Before shrinking on, the difference of diameters at the junction is 0.08 mm. Calculate the radial pressure at the junction and the hoop stresses developed in the two cylinders after shrinking on. Take  $E = 200 \text{ GPa}$ . (12M)
7. A hollow shaft having an internal diameter 60% of its external diameter transmits 450 kW power at 120 rpm. Determine the external diameter of the shaft if the shear stress is not to exceed 60 MPa and the twist in a length of 2.5 m should not exceed  $1^\circ$ . Take  $G = 80 \text{ GPa}$ . (12M)

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**Subject Code: R16ME2103**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**MATERIAL SCIENCE AND METALLURGY  
(ME)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) What is crystal structure of Cementite and Martensite ?
- (b) Draw the cooling curve of pure Iron?
- (c) Why is Gray cast iron annealed?
- (d) State and explain 'Gibb's phase rule.
- (e) Differentiate between Hardness and Hardenability?
- (f) What is a cermet? What is the role of WC and Co in a cermet?

**[2+2+2+2+2+2]**

**PART-B**

**4 X 12 = 48**

2. (a) What is a solid solution? Explain i) Substitutional solid solution ii) Interstitial solid solution **[6M]**
- (b) Differentiate between Ionic, Covalent and metallic bonds? **[6M]**
3. (a) Pearlite, Martensite and Bainite are three types of microstructure which are all found in steels. Describe the microstructures in as much detail as possible. **[6M]**
- (b) Explain how the same steel can be used to generate 100% Pearlite, 100% Martensite and 100% Bainite. What would be the composition of the steel and what heat treatments would be used? **[6M]**
4. (a) Why cast irons preferred to steels for certain applications? Explain with specific examples. Classify different types of Cast irons. **[6M]**
- (b) Classify the steels based on the percentage of carbon along with their important properties and applications **[6 M]**
5. (a) Explain with neat sketch of Jominy End Quench test ? **[6M]**
- (b) What is the principle of the surface hardening of steels using carburizing and nitriding? **[6M]**
6. (a) Describe the effect of zinc content on the properties of brasses. What is dezincification? How it is minimized. **[6M]**
- (b) Discuss about alpha-beta and beta Titanium alloys? **[6M]**

7. (a) Explain briefly in what sporting equipment composite materials are used. What is the main reason why composites are used in these applications? [6M]

(b) What is power metallurgy? Discuss the advantages and disadvantages of P/M technique over the other methods of fabrication. [6M]

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**Subject Code: R16ME2104**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**FLUID MECHANICS  
(ME)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) What is surface tension? Derive the expression for pressure intensity inside Soap Bubble.  
(b) Define stream line, path line, streak line and stream tube.  
(c) State the principle of Venturimeter in measuring the discharge through it.  
(d) State the importance of dimensional analysis.  
(e) List out various minor losses.  
(f) Sketch a boundary layer growth along a flat plate and mark different regions in it. [2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) . State and prove Pascal's law. (6M)  
  
(b) Determine the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is not to exceed 0.3mm. Take surface tension of water in contact with air is 0.0735 Nm. (6M)
3. (a) Discuss the velocity and acceleration of fluid particle. (4M)  
  
(b) Derive continuity equation in Cartesian coordinate system for steady flow. (8M)
4. (a) State and derive Bernoulli's theorem and mention the assumptions clearly. (8M)  
  
(b) A large tank open to atmosphere is filled with water to a height of 5m from the outlet tap. A tap near the bottom of the tank is now opened and water flows out from the smooth and rounded outlet. Determine the water velocity at the outlet. (4M)
5. (a) What are repeating variables? How these repeating variables selected by dimensional analysis? (6M)  
  
(b) The efficiency  $\eta$  of a fan depends on density  $\rho$ , dynamic viscosity  $\mu$  of the fluid, angular velocity  $\omega$  diameter D of the rotor and the discharge Q. Express  $\eta$  in terms of dimensionless parameters. (6M)

6. (a) State impulse momentum equation and discuss its application for pipe bend. (6M)
- (b) Water is flowing through a horizontal pipe line 1500m long and 200mm in diameter. Pressures at the two ends of the pipe line are respectively 12Kpa and 2Kpa. If  $f = 0.015$ , determine the discharge through the pipe in litres per minute. Consider only frictional loss. (6M)
7. (a) Find the displacement thickness, momentum thickness and energy thickness for the velocity distribution in the boundary layer is given by  $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$ . (8M)
- (b) Discuss boundary layer separation. (4M)

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16ME2105

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

## THERMODYNAMICS (ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

### PART-A

1. (a) State Zeroth law of thermodynamics.
- (b) Define Internal energy and Enthalpy.
- (c) What is meant by PMM-2.
- (d) What is the significance of Mollier chart.
- (e) Define Volume fraction and partial pressure.
- (f) List out the processes of Dual combustion cycle.

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

2. (a) Derive the expression for work done in the following process.  
(i) Isothermal Process (ii) Polytropic Process [6 M]
- (b) A milk chilling unit can remove heat from the milk at the rate of 41.87 MJ/h. Heat leaks into the milk from the surroundings at an average rate of 4.187 MJ/h. Find the time required for cooling a batch of 500 kg of milk from 45<sup>o</sup> C to 5<sup>o</sup> C. Take the C<sub>p</sub> of the milk to be 4.187 kJ/kg K. [6 M]
3. (a) Derive the steady flow energy equation with control volume approach and apply for Turbine and Compressor. [6 M]
- (b) A fluid contained in a cylinder receives 150 kJ of mechanical energy by means of a paddle wheel, together with 50 kJ in the form of heat. At the same time a piston in the cylinder moves in such a way that the pressure remains constant at 200 kN/m<sup>2</sup> during the fluid expansion from 2 m<sup>3</sup> to 5 m<sup>3</sup>. what is the change in internal energy and in enthalpy? [6 M]
4. (a) State and prove the Clausius theorem. [6 M]
- (b) A Carnot engine absorbs 200 J of heat from a reservoir at the temperature of the normal boiling point of water and rejects heat to a reservoir at the temperature of the triple point of water. Find the heat rejected, the work done by the engine and the thermal efficiency. [6 M]

5. (a) Draw the phase equilibrium for a pure substance on T-s plot with relevant constant property lines. [6 M]
- (b) A vessel of volume  $0.04 \text{ m}^3$  contains a mixture of saturated water and saturated steam at a temperature of  $250^\circ \text{C}$ . The mass of the liquid present is  $9 \text{ kg}$ . Find the pressure, the mass, the specific volume, the enthalpy, the entropy, and the internal energy. [6 M]
6. (a) Define the following terms.
- (i) Mass fraction                      (ii) Mole fraction                      (iii) Dalton's law of partial pressures [6 M]
- (b) A fluid at  $200 \text{ kPa}$  and  $300^\circ \text{C}$  has a volume of  $0.8 \text{ m}^3$ . In a frictionless process at constant volume the pressure changes to  $100 \text{ kPa}$ . Find the final temperature and the heat transferred (i) If the fluid is air (ii) If the fluid is steam. [6 M]
7. (a) Derive an expression for Mean effective pressure of a Diesel cycle. [6 M]
- (b) Explain the Bell-Coleman cycle with the help of P-v and T-s diagrams. [6 M]

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Subject Code: R16CC2101

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**  
**BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS**

(Common to ECE & CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

1. (a) What do you mean demand Forecasting?
- (b) Define Monopoly
- (c) What is Journal
- (d) Write any three functions of Management
- (e) Define EOQ
- (f) Define Network

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. Evaluate Survey based demand forecasting methods with appropriate examples.
3. Differentiate between Perfect and Imperfect Markets.
4. Prepare a Trail Balance from the following accounting records.

ACCOUNTS	Rs.
Capital	64,000
Sales	1,74,000
Purchases	1,54,000
Carraige Inwards	1,300
Purchase Returns	2,000
Carriage outwards	1,800
Sales Returns	4,000
Furniture	600
Premises	24,000
Motor Van	3,000
Opening Stock	32,000
Debtors	26,000
Drawings	2,000
Creditors	8,700

5. Explain Douglas McGregor's theory 'X' and Theory 'Y'

6. What are the various functions of Marketing Manager?

7. A project consists of the following six activities:

ACTIVITY	DURATION(in weeks)
1-2	3
1-3	7
2-3	5
3-4	4
3-5	2
4-5	8

- Draw the network for the activities stated above
- Identify Critical Path.

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16EC2102

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**ELECTRONIC DEVICES AND CIRCUITS**

**(ECE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

## PART-A

- (a) Draw the energy band structures of Insulators, Semi conductors and Metals  
(b) Explain the temperature dependence of V-I characteristics of P-N diode.  
(c) List the types of rectifiers?  
(d) Define punch through mechanism in BJT.  
(e) What is the need for Biasing  
(f) Why FET is called a voltage operative device? Explain.

[2+2+2+2+2+2]

## PART-B

4 X 12 = 48

- (a) Derive the expression for drift and diffusion current for semiconductors.  
(b) Explain Hall Effect in semiconductors.
- (a) Derive the diode current equation?  
(b) A silicon diode has reverse saturation current of  $2.5 \mu\text{A}$  at  $300^\circ\text{K}$ . Find forward voltage for a forward current of  $10 \text{ mA}$ .
- (a) Explain the construction and working of varactor diode?  
(b) With circuit and necessary waveforms explain the operation of bridge rectifier.
- (a) Write the comparison of CB, CE and CC Configurations  
(b) Derive the relation among  $I_C$ ,  $I_B$ ,  $I_{CBO}$  of transistor currents.
- (a) In a silicon transistor with a fixed bias,  $V_{CC} = 9 \text{ V}$ ,  $R_C = 3 \text{ k}\Omega$ ,  $R_B = 8 \text{ k}\Omega$ ,  $\beta = 50$ ,  $V_{BE} = 0.7 \text{ V}$ . Find the operating point and stability factor.  
(b) Draw the transistor biasing circuit using fixed bias arrangement and explain its principle with suitable analysis.
- (a) Explain A FET amplifier in the common source configuration with a neat circuit diagram.  
(b) Explain the operation of UJT. Draw the characteristics. Mention its application, advantages and disadvantages.

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Subject Code: R16EC2103

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**SIGNALS AND SYSTEMS  
(ECE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. (a) Sketch the unit step signal  $u(-t+1)$  and ramp signal  $3.r(t-1)$ ?
- (b) Define Dirichlet conditions for Fourier series?
- (c) State Duality Property and Linearity Property of Fourier Transform?
- (d) State Initial and Final Value theorems of Laplace Transform?
- (e) State Sampling Theorem?
- (f) Write any two properties of Convolution?

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Find whether the following signals are periodic or not? [6M]
  - (i)  $2 \cos(10t+1) - \sin(4t-1)$
  - (ii)  $3 \cos(4t) + 2 \sin(2\pi t)$
  - (iii)  $2 u(t) + 2 \sin(2t)$
- (b) Find whether the following are energy signals or power signals? [6M]
  - (i)  $e^{-3t} u(t)$
  - (ii)  $e^{j(2t+\frac{\pi}{4})}$
  - (iii)  $\cos(t)$
3. (a) Find the trigonometric Fourier Series for the continuous time periodic signal given by  
$$x(t) = 1.5 \text{ for } 0 \leq t < 1$$
$$= -1.5 \text{ for } 1 \leq t < 2 \text{ with fundamental frequency } \pi ?$$
 [6M]
- (b) Explain about the relation between trigonometric Fourier series and Exponential Fourier Series? [6M]
4. (a) Explain about Fourier Transform of a periodic signal? [6M]
- (b) State and Prove Time Reversal, Time shifting, and Differentiation in time Properties? [6M]
5. (a) Find Laplace Transform and ROC of [6M]
  - (i)  $x(t) = e^{-3t} u(t) + e^{-2t} u(t)$
  - (ii)  $x(t) = e^{-at} u(t) + e^{-bt} u(-t)$
- (b) Derive the relationship between Bandwidth and Rise time? [6M]
6. (a) Explain about different types of sampling techniques? [6M]
- (b) How a signal can be reconstructed from its samples? [6M]
7. (a) Compute & plot the convolution  $y(t)$  of the given signals. [6M]
  - (i)  $X(t)=u(t-4) - u(t-6)$ ,  $h(t)=e^{-2t}u(t)$
  - (ii)  $X(t)=u(t)$ ,  $h(t)= e^{-2t}u(t)$
- (b) Derive the relation between Autocorrelation Function and Power Spectral Density? [6M]

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Subject Code: R16EC2104

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**CONTROL SYSTEMS  
(ECE)**

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

**PART-A**

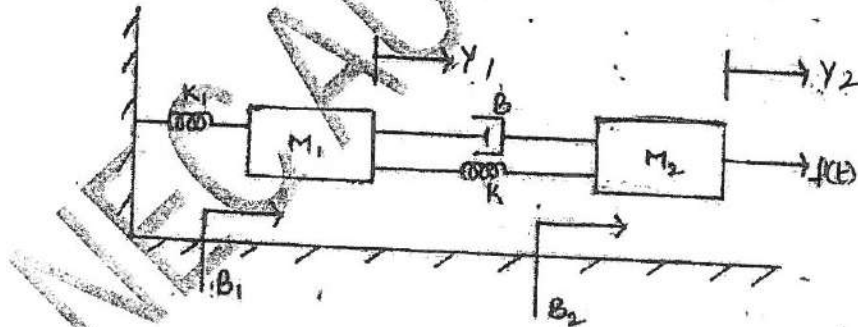
1. (a) Why negative feedback is preferred in control systems.
- (b) Discuss the advantages of signal flow graph over block diagram representation
- (c) Write and explain the expression for rise time, and peak over shoot
- (d) Discuss the necessary conditions for stability of the system.
- (e) Define Resonant peak and Resonant frequency
- (f) What is state transition technique?

[2+2+2+2+2+2]

**PART-B**

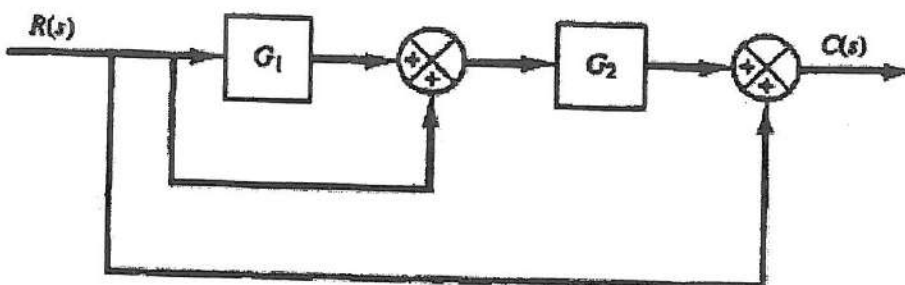
4 X 12 = 48

2. (a) Determine the transfer function of the following mechanical system?



- (b) What is the classification of control systems and discuss the importance of mathematical modeling of a control system.

3. (a) Derive the transfer function of Dc servo motor
- (b) Simplify the diagram shown in the following figure:



4. (a) Using Routh-Hurwitz criterion, determine the stability of the closed loop system that has the following characteristic equation and also determine the number of roots that are in the right half s-plane and on the imaginary axis  $s^4 + s^3 + 3s^2 + 2s + 5 = 0$ .
- (b) Explain the procedure to draw root locus of a given transfer function.

5. (a) Find resonant peak, resonant frequency and bandwidth of the unity feedback system whose open loop transfer function is as follows:

$$G(s) = \frac{0.5}{(s^2 + 3s + 2)}$$

- (b) Explain the procedure to determine the gain margin and phase margin of a system from its Bode plot?
6. (a) Draw the electrical circuit diagram that represents the Lead Compensator and explain in detail [4M]
- (b) The state equation of a linear time invariant system is represented by

$$\frac{d x(t)}{dt} = A x(t) + B u(t)$$

$$A = \begin{bmatrix} 3 & 0 \\ 0 & -3 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Find the state transition matrix and the Eigen values of A [8M]

7. Write short notes on the following:
- Controllability and observability
  - properties of State transition matrix
  - Diagonalization

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**Subject Code: R16EC2105**

**II B.Tech I Semester Regular/supple Examinations, Nov - 2018**

**DATA STRUCTURES**

**(ECE)**

**Time: 3 hours**

**Max Marks: 60**

**Question Paper Consists of Part-A and Part-B.**

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**  
All questions carry equal marks of 12.

**PART-A**

1. (a) List out some examples for linear and non-linear data structures.
- (b) Differentiate between linear search and binary search
- (c) Write the differences between stack and queue.
- (d) What does the dummy header in linked list contain?
- (e) Draw a binary tree with five nodes and three leaves.
- (f) What is transitive of a graph?

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) Explain the various operations on data structures [6M]  
(b) Explain recursive algorithm for Fibonacci sequence [6M]
3. (a) Write an algorithm to implement Binary Search technique. Use the algorithm to search 32 in the following list of elements. Explain the process at each step. [6M]  
12, 16, 17, 19, 20, 22, 24, 29, 30, 32, 37  
(b) Sort the elements using Merge Sort:  
52, 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72 [6M]
4. (a) Explain the process of conversion of infix expression into a postfix expression with suitable example [6M]  
(b) Explain about Circular Queues implementation [6M]
5. (a) What are the operations of a singly linked list? Discuss. [6M]  
(b) What is Double linked list? Describe creation and operations of Double linked list?[6M]
6. (a) Write the non recursive algorithm using stack for the Preorder traversal of a binary tree [6M]  
(b) Write the algorithm for insertion and deletion of binary search trees? [6M]
7. (a) What is Graph? Explain two representation methods of graph? [6M]  
(b) Discuss about BFS with example. [6M]

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**Subject Code: R16EC2106**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**ELECTRICAL AND MECHANICAL TECHNOLOGY  
(ECE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

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**PART-A**

1. (a) Explain the basic principle operation of DC generator?
- (b) Define the term 'Regulation'?
- (c) How are moving iron instruments classified?
- (d) Explain about Brazing and soldering?
- (e) Explain the term Radiation?
- (f) What are the classifications of gears?

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2. (a) Deduce the equation for the EMF induced in a DC machine?
- (b) Explain different losses that occur in a transformer?
3. Briefly explain the regulation by synchronous impedance method?
4. Draw the block diagram of general purpose CRO. Explain the functions of various blocks?
5. Write short notes on a) Arc welding b) Resistance welding c) gas welding?
6. (a) Explain the thermo physical properties?
- (b) A cubical tank of water of volume  $1 \text{ m}^3$  is kept at a steady temperature of  $650^\circ\text{C}$  by a 1 KW heater. The heater is switched off. How long does the tank to take to cool to  $500^\circ\text{C}$ , If the room temperature is  $150^\circ\text{C}$ .
7. Briefly explain the various types of belts used for the transmission of power and applications of gears?

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2102

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

## PART-A

1. (a) What is a tautology? Give an example.
- (b) Discuss free and bound variables
- (c) Define inverse of a function. Give an example.
- (d) How many edges are there in a graph with 10 vertices each of degree 6?
- (e) State the counting principle and pigeonhole principle.
- (f) What is the order and degree of a recurrence relation?

[2+2+2+2+2+2]

## PART-B

4 X 12 = 48

2. (a) Obtain disjunctive normal forms for the following

[6M]

i)  $P \wedge (P \Rightarrow Q)$

ii)  $P \Rightarrow (P \Rightarrow Q) \vee \sim(\sim P \vee \sim P)$

- (b) Explain biconditional statement and tautology with example

[6M]

3. (a) Construct truth table for  $(\sim P \leftrightarrow \sim Q) \leftrightarrow (Q \leftrightarrow R)$

[6M]

- (b) State and explain principle of mathematical induction. Show that  $n^3 - 7n + 3$  is divisible by 3 for all positive integers.

[6M]

4. (a) Define Relation and function. Consider the following relations on the set  $A = \{1, 2, 3\}$ :  $f = \{(1, 3), (2, 3), (3, 1)\}$ ;  $g = \{(1, 2), (3, 1)\}$ ;  $h = \{(1, 3), (2, 1), (1, 2), (3, 1)\}$  which of these are functions?

[6M]

- (b) Let  $X = \{1, 2, 3, 4, 5, 6, 7\}$  and  $R = \{(x, y) / x - y \text{ is divisible by } 3\}$  in  $X$ . show that  $R$  is an Equivalence Relation?

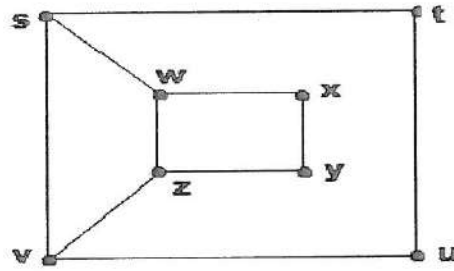
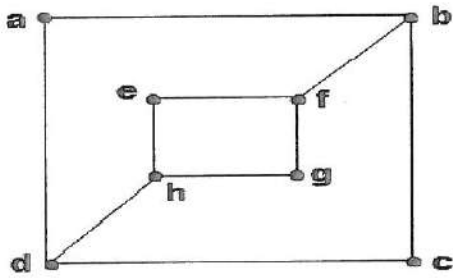
[6M]

5. (a) Write the adjacency matrix of the digraph  $G = \{(V_1, V_3), (V_1, V_2), (V_2, V_4), (V_3, V_1), (V_2, V_3), (V_3, V_4), (V_4, V_1), (V_4, V_2), (V_4, V_3)\}$ . Also draw the graph

[6M]

- (b) Show that the following graphs are not isomorphic.

[6M]



6. (a) In any Boolean algebra, show that

(i)  $xy^1 + x^1y = 0$  iff  $x=y$

(ii)  $(x + y^1)(y+z^1)(z+x^1) = (x^1 + y)(y^1 + z)(z^1 + x)$ .

[6M]

(b) How many permutations are there in the word

i) MISSISSIPPI

ii) MALAYALAM

[6M]

7. (a) Explain Generating function and explain various operation on generating function [6M]

(b) Solve the following recurrence relation.

$a_{n+1} - 8a_n + 16a_{n-1} = 4^n; n \geq 1; a_0 = 1, a_1 = 8.$

[6M]

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2103

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

## JAVA PROGRAMMING (CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**  
All questions carry equal marks of 12.

### PART-A

1

- Why is Java known as platform independent?
- What are the different data types in Java?
- List any four built-in exceptions in Java.
- Differentiate between thread and process
- What are the differences between applet and application program?
- Differentiate text field and text area

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

- What are the drawbacks of procedural languages? Explain the need of object oriented programming with suitable program. [6M]
  - List and explain java buzzwords [6M]
- Write a java program to sort the students in your class according to the rank obtained in the examination. [6M]
  - How to assign the values to the variables in the class at the time of creation of object to that class? Explain with example. [6M]
- Explain the concept and types of inheritance used in Java. [6M]
  - How to define a package? How to access, import a package? Explain with examples. [6M]
- What are threads? How we can create threads? Illustrate with a simple example and explain. [6M]
  - Explain the synchronization of multiple threads in Java with an example. [6M]
- Discuss in detail about Applet life cycle [6M]
  - Explain the different types of event listeners supported by java [6M]
- Describe about various components in AWT. [6M]
  - Discuss different Layout managers. [6M]

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**Subject Code: R16CS2104**

**II B.Tech I Semester Regular and Supplementary Examinations, November-2018.**

**DATA STRUCTURES**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**

All questions carry equal marks of 12.

**PART-A**

1. (a) Take a Linear search algorithm and discuss best time complexity.
- (b) What do you mean by Hashing. Explain how hashing is performed.
- (c) How stack is different from Queue. Explain with a real time example.
- (d) What are the applications of Singly linked List.
- (e) Define path in a tree. Take sample tree and construct an example path.
- (f) How to identify the degree of a graph. Define in-degree and out-degree.

[2+2+2+2+2+2]

**PART-B**

4 X 12 = 48

2. (a) Define data structure. Discuss different types of data structures and their applications. [6M]
- (b) Explain how to implement polynomial ADT using array. Discuss its advantages and disadvantages. [6M]
3. (a) Sort the following elements using Quick sort. [6M]  
45, 34, 12, 46, 27, 56, 11, 87, 6, 33, 28
- (b) Construct max heap for the following: 140, 80, 30, 20, 10, 40, 30, 60, 100, 70, 160, 50, 130, 110, 120 [6M]
4. (a) Define queue. Explain the types of Queues with an example. [6M]
- (b) Write an algorithm to implement Queue using Stack. [6M]
5. (a) Differentiate between Doubly and Circular Linked List. [6M]
- (b) Write an algorithm to insert, delete and display the elements in a given doubly linked list. [6M]
6. (a) Define Tree. Explain the types on trees. [6M]
- (b) What are the different tree traversing techniques? Explain with an example. [6M]
7. Explain Graph traversal techniques, with illustrative examples. [12M]

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# Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CS2105

II B.Tech I Semester Regular and Supplementary Examinations, November-2018.

## COMPUTER ORGANIZATION (CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B  
All questions carry equal marks of 12.

### PART-A

1. (a) Give structure of Three – state bus buffer. How many states are available in that. Describe each state neatly.
- (b) Define an Instruction. What are the types of instruction, and give the list phases of Instruction life cycle.
- (c) How RISC is different from CISC. Give the applications of RISC and CISC.
- (d) How a Logical address is converted into Physical Address. Explain with an Example.
- (e) Define Handshaking. Explain with An example.
- (f) Give the situation of occurring Division overflow. Explain with an example.

[2+2+2+2+2+2]

### PART-B

4 X 12 = 48

2. (a) Explain the block diagram of Micro computer with neat diagram. [6M]
- (b) Construct a 4-bit Arithmetic circuit and explain how to perform all arithmetic operations using that circuit. [6M]
3. Give a detailed description on the following computer instructions. [6M+6M]  
i) Register reference Instructions ii) Memory Reference Instructions.
4. Define addressing mode. What is the use of addressing modes. Explain all addressing modes in detail with a numerical example. [12M]
5. (a) How read and write operations takes place in one  $k \times 1$  memory chip? Explain. [6M]
- (b) Explain any two cache mapping functions. [6M]
6. (a) With a neat block diagram explain any two methods of handling multiple I/O devices. [6M]
- (b) What is the necessity of DMA controller? Explain the method of bus arbitration. [6M]
7. Explain Booth's Algorithm . Multiply 01110(+14) and 11011(-5) using Booth's multiplication. [12M]

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Subject Code: R16CS2106

**II B.Tech I Semester Regular and Supplementary Examinations, Nov-2018.**

**FORMAL LANGUAGES AND AUTOMATA THEORY**

**(CSE)**

**Time: 3 hours**

**Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

**PART-A**

1. a) State the components of finite automata
- b) What are the different types of grammars?
- c) Differentiate DFA and NFA
- d) State Ardens Theorem
- e) Write the syntax of the productions in CNF
- f) What is undecidable problem?

[2+2+2+2+2+2]

**PART-B**

**4 X 12 = 48**

2 a) Explain mathematical representation of finite automata with suitable example [6M]

b) Discuss advantages and disadvantageous of FSM [6M]

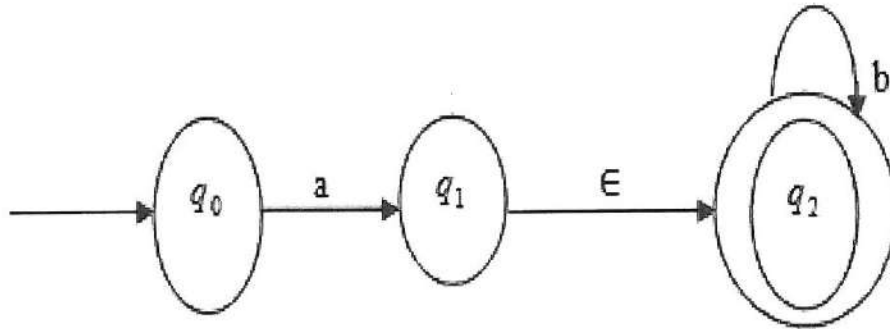
3 a) Describe Chomsky Hierarchy of languages [6M]

b) The context sensitive language  $G=(V,T,P,S)$ , where the productions  $p=\{ S \rightarrow abc/aAbc; Ab \rightarrow bA; Ac \rightarrow Bbcc; bB \rightarrow Bb \}$ . Check the string 'aaabbbccc' is generated by the grammar or not. [6M]

4 a) Convert the following NFA into DFA [6M]

$Q \backslash \Sigma$	0	1
$\rightarrow p$	(p, q)	p
q	r	r
r	s	$\Phi$
s	s	s

b) Convert the following NFA with  $\epsilon$ -moves into equivalent NFA without  $\epsilon$ -moves [6M]



5. a) List the properties of regular sets [6M]

b) Construct NFA for the regular expression  $(10 + 01)$  [6M]

6. a) Convert the following grammar to CNF [6M]

$$S \rightarrow 0S0 \mid 1SA \mid A$$

$$A \rightarrow 2B3$$

$$B \rightarrow 2B3 \mid 3$$

[6M]

b) Consider a DPDA  $M = (\{p, q\}, \{a, c\}, \{a, Z_0\}, \delta, p, Z_0, \emptyset)$  accepting the language

$\{a^n c a^n; n \geq 1\}$  where  $\delta$  is defined as follows

$$\delta(p, a, Z_0) = (p, a, Z_0)$$

$$\delta(p, a, a) = (p, aa)$$

$$\delta(p, c, a) = (q, a)$$

$$\delta(q, a, a) = (q, \epsilon)$$

$$\delta(q, \epsilon, Z_0) = (q, \epsilon)$$

Check whether the string 'aacia' is accepted by empty stack or not [6M]

7 a) Explain the 7-tuple notation of a Turing machine [6M]

b) Discuss P and NP classes of languages [6M]

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