

BAS-07

Roll No. 2019031067

B.Tech. 1st Year
 Even Semester
 Minor Test (2019 -2020)
 Engineering Mathematics- II

Time: 2 Hrs.

Max. Marks: 30

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

4

(a) Solve, $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 2x^2e^x \cos x + 3^x + 1$.

3

(b) Solve

i. $(x^2D^2 + 3xD + 1)y = \frac{1}{(1-x)^2}$ and

ii. $\frac{d^2y}{dx^2} - \frac{1}{x}\frac{dy}{dx} + 4x^2y = x^4$.

3

(c) Solve the simultaneous differential equation:

$$\frac{dx}{dt} + \frac{dy}{dt} - 2y = 2\cos t - 7\sin t, \quad \frac{dx}{dt} - \frac{dy}{dt} + 2x = 4\cos t - 3\sin t.$$

3

(d) Solve the following differential equations by the method of variation of parameter

$$x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = v^2 e^x.$$

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

4

(a) Using method of Frobenius, obtain the series solution in power of x for $x \frac{d^2y}{dx^2} + \frac{dy}{dx} - y = 0$.

3

(b) Solve $(1 - x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = x(1 - x^2)^{\frac{3}{2}}$.

3

(c) State and prove Orthogonality of Legendre's polynomials.

(d) Prove that $x^2 J'' = (n^2 - n - x^2)J_n + xJ_{n+1}$, where n is positive integer.

Q.3 Attempt any Three parts of the following. Q. 3(a) is compulsory.

4

(a) Prove that $(2n+1)(x^2 - 1)P'_n = n(n+1)(P_{n+1} - P_{n-1})$ and hence evaluate $\int_{-1}^1 (x^2 - 1)P_{n+1} P'_n dx$.

3

(b) Find the series solution of Bessel's differential equation of n^{th} order and hence define Bessel's function of first kind.

3

(c) An inductance L of 2.0 H and a resistance R of 20Ω are connected in series with an e.m.f. E volt. If the current I is zero when $t = 0$, find the current I at the end of 0.01 second if $E = 100 \text{ V}$, using the differential equation $L \frac{di}{dt} + Ri = E$.

3

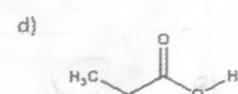
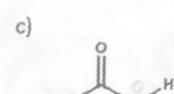
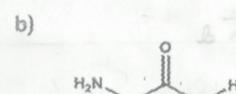
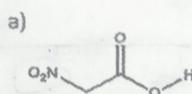
(d) Prove that $\int_{-1}^1 x P_n P'_n = \frac{2n}{2n+1}$ and $\int_0^{2\pi} \sqrt{\pi x} J_{\frac{1}{2}}(2x) dx = 1$.

3

**B.Tech.-I Year
ODD SEMESTER
Minor Examination 2019-2020
Subject Name: Engineering Chemistry**

Time: 2 hrs.**Max. Marks: 20****Note: Attempt all questions.****Q.1** Attempt any three of the following. Q. 1(a) is compulsory.

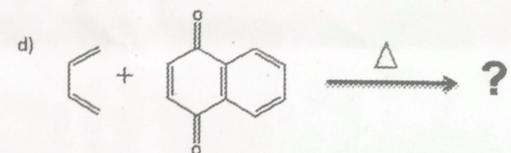
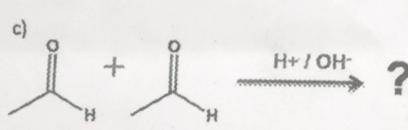
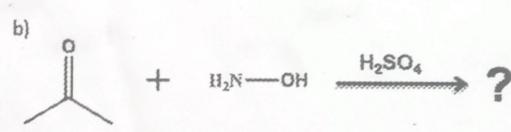
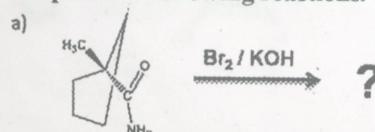
- (a) i) What is inductive effect? Explain the at least five applications of inductive effect. (4)
 ii) Arrange the following compounds in increasing order of acidity and explain.



- (b) With the help of Molecular orbital diagram arrange the following species in order of their bond length, and bond order. Also write their magnetic character. (2)



- (c) Complete the following reactions. (2)



- (d) i) What is meant by intermolecular and intramolecular H-bonding?

(2)

- ii) Why ortho-nitrophenol is more volatile than para-nitrophenol? Explain.

Q.2 Attempt any two of the following. Q. 2(a) is compulsory.

- (a) Define and explain the terms involved in phase rule. Draw and Explain neat labeled phase diagram for water system. (4)

- (b) What is liquid crystal? Differentiate between nematic and smectic liquid crystals? Write at least four applications of liquid crystals. (2)

- (c) Describe the structure and application of graphite. How it acts as conductor of electricity? (2)

Q. 3 Attempt any two of the following. Q. 3(a) is compulsory.

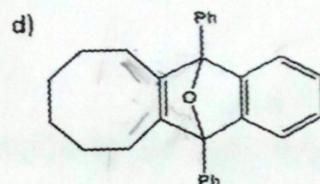
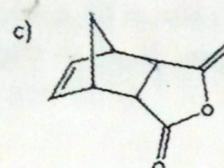
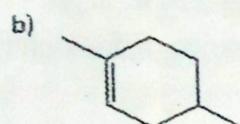
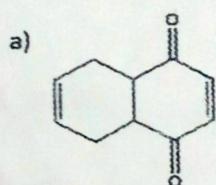
- (a) i) What is Aldol condensation? Discuss the mechanism of the reaction.

(4)

- ii) Explain E1 and E2 reactions with suitable examples and discuss its mechanism.

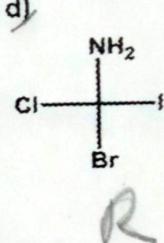
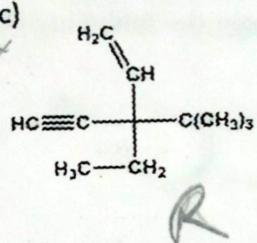
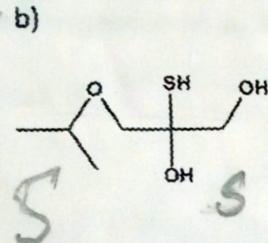
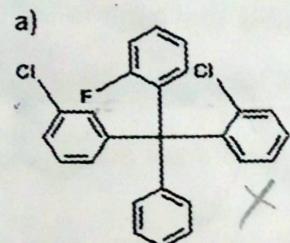
- (b) i) From what reactants could each of the following compounds be synthesized?

(2)

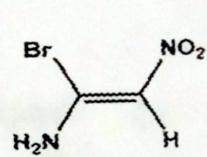
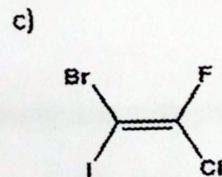
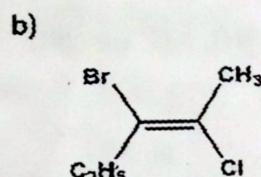
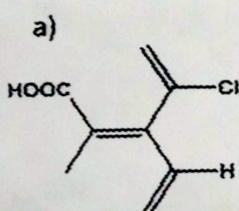


- (c) i) Discuss the mechanism of $\text{S}^{\text{N}}2$ reaction.
 ii) Allocate R and S configuration to the chiral carbons in the given compounds as under.

(2)



- ii) Allocate the symbol E or Z to each of the following compounds and explain.



Name of the Course: B. Tech-I year

Odd Semester

Minor Examination: 2019-20

Subject Name: Engineering Mathematics -I

Time: 2 hrs.

Max. Marks: 30

Note: Answer all questions.

Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.

- (a) (i) If $u = \frac{1}{r}$ and $r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$, prove that

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0.$$

- (ii) find the n^{th} order derivatives of the function

$$f(x) = \frac{x^2}{x^2 + a^2}.$$

- (b) Define the rank of a matrix properly and normal form of a matrix. Also find the rank of given matrix by normal form-

$$\begin{bmatrix} 2 & 4 & 3 & -2 \\ -3 & -2 & -1 & 4 \\ 6 & -1 & 7 & 2 \end{bmatrix}$$

- (c) If $u = \sin^{-1} \left(\frac{x^4 - y^4}{x - y} \right) + \left(\frac{x^2 + y^2}{x - y} \right)$, then evaluate

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial y \partial x} + y^2 \frac{\partial^2 u}{\partial y^2}.$$

- (d) Prove that u, v, w are dependent or not. If they are dependent, find the relation between them

$$u = \frac{3x^2}{2(y+z)}, v = \frac{2(y+z)}{3(x-y)^2}, w = \frac{x-y}{x}.$$

Q.2 Attempt any three parts of the following. Q. 2(a) is compulsory.

- (a) If $x = \cos h \left[\left(\frac{1}{m} \right) \log y \right]$ Prove that

$$(i) (x^2 - 1)y_2 + xy_1 = m^2 y$$

$$(ii) (x^2 - 1)y_{n+2} + (2n+1)x y_{n+1} + (n^2 - m^2)y_n = 0.$$

If possible find $(y_n)_0$.

4

- (b) If $V = f(2x - 3y, 3y - 4z, 4z - 2x)$, compute the value of $6V_x + 4V_y + 3V_z$. 3
- (c) Examine $f(x, y) = x^3 + y^3 - 3xy$ for maxima and minimum values. 3
- (d) Find the expansion of the function $f(x, y) = e^x \log(1+y)$ in a Taylor's series in the neighborhood of the point $(1, 2)$ upto third degree term 3

Q.3 Attempt any three parts of the following. Q. 3(a) is compulsory.

- (a) Find the rank of the following matrices by converting triangular form or row echelon form, where 4

$$\left[\begin{array}{cccc} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{array} \right]$$

- (b) Find the inverse of the following matrix by applying elementary operations 3

$$\left[\begin{array}{cccc} 2 & 1 & -1 & 2 \\ 1 & 3 & 2 & -3 \\ -1 & 2 & 1 & -1 \\ 2 & -3 & -1 & 4 \end{array} \right]$$

- (c) Find the Eigen values and Eigen vectors of given matrix 3

$$\left[\begin{array}{ccc} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{array} \right]$$

- (d) Examine the consistency of the following system of equations and solve them if they are consistent- 3

$$\begin{aligned} x+2y-z &= 3 \\ 3x-y+2z &= 1 \\ 2x-2y+3z &= 2 \\ x-y+z &= -1 \end{aligned}$$

$$\begin{aligned} A &\rightarrow \text{diag}^{-1} \\ A \cdot A^{-1} &= I \\ A \cdot A^{-1} &= I \\ A^{-1} \cdot A &= I \\ A^{-1} &= I \end{aligned}$$

B.Tech.

SEM (I) ODD SEMESTER

MAJOR EXAMINATION 2019-2020

FUNDAMENTALS OF ELECTRONICS ENGINEERING

Max. Marks: 50

Time: 3Hrs.

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any five parts of the following (5×2=10)

- (a) The reverse saturation current of a Si p-n junction diode is $10\mu A$ at 300K. Determine the forward bias voltage to be applied to obtain diode current of 100mA.
- (b) Classify the materials with help of energy band diagram.
- (c) Write down the constructional difference between Depletion type and Enhancement type MOSFET.
- (d) Differentiate the characteristic of CB, CE, and CC configurations of BJT.
- (e) Define threshold voltage (V_T), transconductance (g_m) and pinch-off voltage (V_P) in the context of FET device.
- (f) The self-bias configuration shown in Fig. 1 has an operating point defined by V_{GSQ} = -2.6 V and $I_{DQ} = 2.6$ mA, with $I_{DS} = 8$ mA and $V_P = -6$ V. The value of g_{os} is given as 20 mS. Determine g_m , Z_i , Z_o and A_v .
- (g) Determine the output waveform for the network of Fig. 2 and calculate the output dc level.

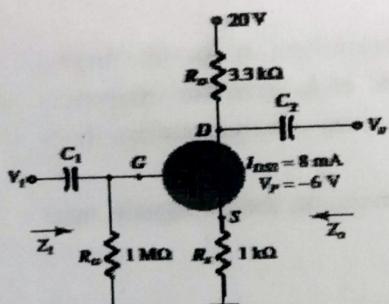


Fig. 1

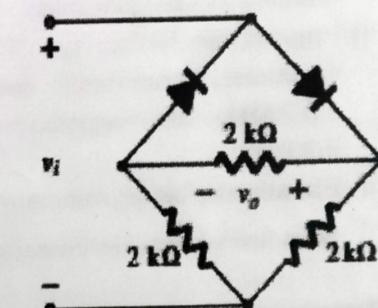
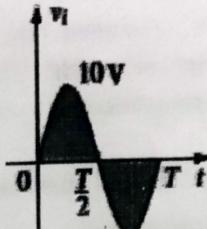


Fig. 2

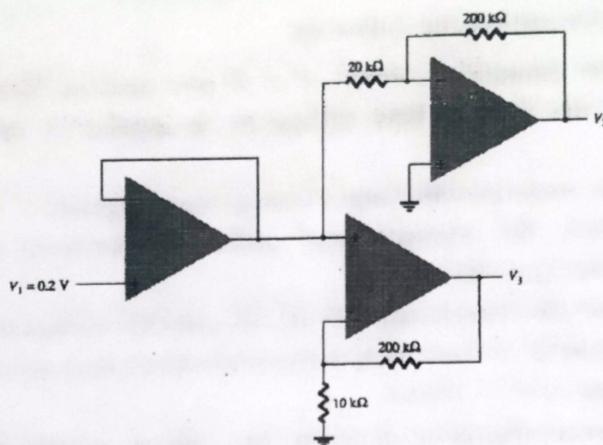
Q.2 Attempt any two parts of the following: (2×5=10)

- (a) Reduce the Boolean function using k-map technique and implement using gates
 $f(w, x, y, z) = \sum m(0, 1, 4, 8, 9, 10)$ which has don't care condition $d(w, x, y, z) = \sum m(2, 11)$
- (b) Convert the following $(562.13)_7 = (?)_{10}$ $(467.342)_8 = (?)_{10}$

- (c) Write four advantages of Digital Systems over Analog Systems and implement the expression $Y = ABC' + BD + E$ using NAND gate only.

Q.3 Attempt any two parts of the following: (2×5=10)

- (a) Enlist the characteristics of an ideal OP-AMP. Draw the PIN diagram of IC741 and name all pins.
 (b) Draw the OP-AMP summing amplifier and integrator circuit and obtain expression for the output voltage.
 (c) Calculate the output voltage V_2 and V_3 in the circuit of figure.



Q.4 Attempt any two parts of the following: (2×5=10)

- (a) Sketch the neat block diagram of CRO. What is the utility of delay line and trigger circuit. Which part of CRT is known as electrostatic focusing system? How the intensity to be controlled?
 (b) Explain the Ramp type DVM. Calculate the maximum time t_1 for the digital voltmeter if maximum counting pulses $N = 1999$ and clock generator frequency 1.5 MHz. Also suggest a suitable frequency for the ramp generator select ($t_2 = 0.25t_1$).
 (c) Explain the block diagram of a DMM, how can measure dc and ac signals, and what are various electrical specifications?

Q.5 Attempt any two parts of the following: (2×5=10)

- (a) Explain the working of integrating type DVM.
 (b) Explain how frequency, phase and voltage are measured by CRO
 (c) Define dual slope-integrator and zero cross detector. Sketch the block diagram and system waveforms for a digital voltmeter that uses a dual-slope integrator.

B. Tech. I Semester
 ODD SEMESTER
 MAJOR EXAMINATION 2019 - 2020

Subject Name: : Engineering Mathematics-I

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any five parts of the following: (5×2 = 10)

- (a) If $y = \frac{\log x}{x}$, then show that $y_n = \frac{(-1)^n n!}{x^{n+1}} \left[\log x - 1 - \frac{1}{2} - \frac{1}{3} - \dots - \frac{1}{n} \right]$, where y_n is the n^{th} differential coefficient of y w.r.t. x .
- (b) If $u = \frac{yz}{x}$, $v = \frac{zx}{y}$ and $w = \frac{xy}{z}$, then show that $\frac{\partial(u,v,w)}{\partial(x,y,z)} = 4$.
- (c) Expand $x^2y + 3y - 2$ in powers of $(x - 1)$ and $(y + 2)$ using Taylor's theorem.
- (d) Find the shortest and longest distance from the point $(1, 2, -1)$ to the sphere $x^2 + y^2 + z^2 = 24$.
- (e) The product of two eigen values of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ is 16. Find the third eigen value. Find the sum of these eigen values.
- (f) For what values of k , the equations $x + y + z = 1$, $2x + y + 4z = k$, $4x + y + 10z = k^2$ has
 (i) Infinite no. of solutions (ii) Unique solution
- (g) Find the value of a if rank of the matrix $A = \begin{bmatrix} 4 & 4 & -3 & 1 \\ 1 & 1 & -1 & 0 \\ a & 2 & 2 & 2 \\ 9 & 9 & a & 3 \end{bmatrix}$ is 3.

2. Attempt any two parts of the following:

(2×5 = 10)

- (a) (i) Find the smaller of the areas bounded by curves $y = 2 - x$ and $x^2 + y^2 = 4$ using double integration.
 (ii) Using change of order of integration, evaluate
- $$\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2 + y^2}} dy dx$$
- (b) (i) Find the volume of the tetrahedron bounded by the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ and the coordinate planes.
 (ii) If l, m and n are all Positive, then show that the triple integral
- $$\iiint_V x^{l-1} y^{m-1} z^{n-1} dx dy dz = \frac{\Gamma l \Gamma m \Gamma n}{\Gamma(l+m+n+1)}$$
- where V is the region $x \geq 0, y \geq 0, z \geq 0$ and $x + y + z \leq 1$.
- (c) Show that
 (i) $\beta\left(m, \frac{1}{2}\right) = 2^{2m-1} \beta(m, m)$.
 (ii) $\int_0^\infty x^n e^{-a^2 x^2} dx = \frac{1}{2a^{n+1}} \Gamma\left(\frac{n+1}{2}\right)$.

3. Attempt any two parts of the following: $(2 \times 5 = 10)$

(a) Evaluate

(i) $\int_0^1 \frac{x^3 - 2x^4 + x^5}{(1+x)^7} dx$

(ii) $\int_0^1 \log(\Gamma x) dx$

(b) Evaluate $\iint_A \frac{dxdy}{\sqrt{xy}}$, using the substitutions $x = \frac{u}{1+v^2}$, $y = \frac{uv}{1+v^2}$, where A is bounded by $x^2 + y^2 - x = 0$ and $y \geq 0$.

(c) Find the area and mass contained in the first quadrant enclosed by the curve $\left(\frac{x}{a}\right)^\alpha + \left(\frac{y}{b}\right)^\beta = 1$, where $\alpha > 0, \beta > 0$ and density at any point (x, y) is $k\sqrt{xy}$.

4. Attempt any two parts of the following: $(2 \times 5 = 10)$

(a) Verify Green's theorem in a plane for $\int_C e^{-x} (\sin y dx + \cos y dy)$, C being the rectangle with vertices $(0, 0)$, $(\pi, 0)$, $(\pi, \frac{\pi}{2})$ and $(0, \frac{\pi}{2})$.

(b) (i) Evaluate line integral $\int_C (y^2 dx - x^2 dy)$ around the triangle whose vertices are $(1, 0)$, $(0, 1)$ and $(-1, 0)$ in the positive sense.

(ii) Find the maximum value of the directional derivative of $\phi = x^3yz$ at the point $(1, 4, 1)$.

(c) Evaluate $\int_S \vec{F} \cdot \hat{n} dS$ if $\vec{F} = yz\hat{i} + zx\hat{j} + xy\hat{k}$ and S is the part of surface $x^2 + y^2 + z^2 = 1$ which lies in the first octant. $(2 \times 5 = 10)$

5. Attempt any two parts of the following:

(a) Verify Gauss divergence theorem for $\vec{F} = a(x+y)\hat{i} + a(y-x)\hat{j} + z^2\hat{k}$ over the region bounded by the upper hemisphere $x^2 + y^2 + z^2 = a^2$ and the plane $z = 0$.

(b) Verify Stokes theorem for $F = (x^2 - y^2)\hat{i} + 2xy\hat{j}$ in the rectangular region in the $x-y$ plane bounded by the lines $x = 0, x = a, y = 0, y = b$.

(c) (i) Given the vector field $\vec{V} = (x^2 - y^2 + 2xz)\hat{i} + (xz - xy + yz)\hat{j} + (z^2 + x^2)\hat{k}$. Find $\text{curl } \vec{V}$ and also show that vectors given by $\text{curl } \vec{V}$ at points $(1, 2, -3)$ and $(2, 3, 12)$ are orthogonal.

(ii) Show that $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$, where $r^2 = x^2 + y^2 + z^2$. Hence show that $\nabla^2 \left(\frac{1}{r}\right) = 0$.

B.Tech.

ODD SEMESTER

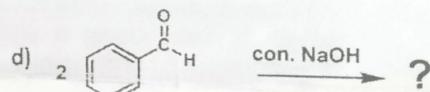
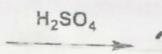
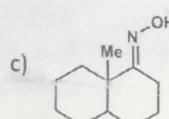
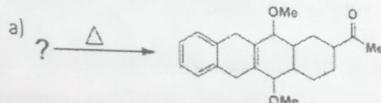
Major Examination 2019-2020

Time: 3 hrs. Max. Marks: 50

Subject Name: Engineering Chemistry
Note: Attempt all questions. All questions carry equal marks.

Q.1 Attempt any five of the following.

- (a) What are conductors, semiconductors and insulators? 2
- (b) Draw MO energy level diagram for the CO molecule. What is the order of bond length $\text{CO}, \text{CO}^+, \text{CO}^-$. 2
- (c) Explain the terms: stable equilibrium and metastable equilibrium. 2
- (d) Discuss the different conformations of butane. How will you account for the difference in their relative stability? 2
- (e) (i) Differentiate between bonding and anti-bonding molecular orbitals. 2
(ii) Mention the rules for LCAO method for the formation of molecular orbitals.
- (f) Complete the following reactions. 2



- (g) Discuss the mechanism of Cannizzaro and Aldol condensation reactions. 2

Q.2 Attempt any two of the following.

- (a) Discuss the differences between Thermoplastic and Thermosetting polymers. Write a brief note on conducting polymers. 5
- (b) Give the structure and monomer name of the following polymers: 5
i) Nylon-6,6 ii) Terylene iii) SBR iv) Orlon v) PMMA vi) Polystyrene
vii) Nylon-6 viii) Polyvinylacetate ix) Polyacrylonitrile x) Polyethyl acrylate
- (c) Differentiate between addition polymers and condensation polymers. Starting from phenol, how can nylon-6 be prepared? 0.834 g sample of a solid fuel on complete combustion in the excess of oxygen increased the temperature of water in a bomb calorimeter from 14.36°C to 18.10°C . The mass of water in calorimeter was found to be 1365 g. Calculate the H. C. V and N. C. V. of the fuel; if the water equivalent of calorimeter, etc.' is 135 g. 5

Q. 3 Attempt any two of the following.

- (a) What is Ziegler-Natta catalyst? How will you synthesis Glyptal or Alkyd resin from Phthalic anhydride? Write a mechanism for the polymerization of ethylene in the presence of an organic peroxide as catalyst. 5
- (b) Write notes on: 5
(i) Free radical polymerization ii) cationic polymerization iii) Bakelite iv) Synthetic fibers.

- (c) What are graft and block copolymer? Classify the polymers on the basis of tacticity. A sample of polymer contains: C = 83%, O = 6% and H = 1%. The following data were obtained when the above polymer was tested in a bomb calorimeter:
 Weight of polymer = 1.84g,
 Weight of water taken = 1100g
 Water equivalent of calorimeter = 4,400g
 Rise in temperature = 4.84°C
 Calculate the gross and net calorific values of polymer, assuming that the latent heat of condensation of steam is 580 cal/g.

Q. 4 Attempt any two of the following. 5

- (a) Describe the different molecular vibrations encountered in IR spectroscopy. How would you distinguish between the compounds in each of the following pairs by IR spectral studies?

- (i) Phenol and Cyclohexanol
- (ii) Cis and Trans butane
- (iii) Diethylketone and Ethylamine
- (iv) Acetaldehyde and Acetone

- (b) (i) The absorbance of $MgSO_4$ solution containing 0.500 mg Mg/mL was reported as 0.3500 at 440 nm.
 a) Calculate the specific absorptivity, including units, $MgSO_4$ on the assumption that a 1.00 cm cuvette was used.

- b) What will be the absorbance if the solution is diluted to twice its original volume?

- (ii) Guanosine has a maximum absorbance of 275nm. $\epsilon_{275} = 8400 M^{-1} cm^{-1}$ and the path length is 1cm. Using a spectrophotometer, you find that $A_{275} = 0.70$. What is the concentration of guanosine?

- (c) What is Shielding and Deshielding? Give the structure consistent with the following NMR data: 5

Molecular formula is $C_{11}H_{16}$

- i) Singlet at $\delta = 0.94$, 9H
- ii) Singlet at $\delta = 7.28$, 5H
- iii) Singlet at $\delta = 2.4$, 2H

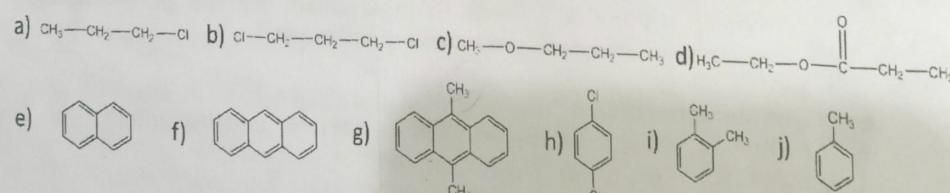
Why is mass spectrometry useful? What are the applications of mass spectrometry?

Q. 5 Attempt any two of the following.

- (a) State Zeolite process for the removal of hardness of water. Explain the merits and demerits of lime soda process. 5

- (b) Give the basic principle of UV spectroscopy. Explain various types of electronic transition. Distinguish between i) 1,3-pentadiene and 1,4-pentadiene ii) ethylene and 1,3-butadiene iii) naphthalene and anthracene by U.V. spectroscopy. 5

- (c) How many NMR signals do you expect from each of the following compound? Indicate also the splitting pattern of the various signals. 5



B. Tech.

SEMESTER -Ist

MAJOR EXAMINATION 2018 - 2019

Subject Name: Engineering Physics-I

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carry equal marks.

- 1.** Attempt any five parts of the following: $(5 \times 2 = 10)$
- (a) What do you mean by frame of reference? What are the differences between inertial and non-inertial frame of reference?
 - (b) Derive the relativistic velocity addition theorem. Show that no material particle can travel faster than the velocity of light.
 - (c) The mass of a moving electron is 11 times its rest mass. Find the kinetic energy and momentum.
 - (d) Establish Einstein's mass-energy relation. Give two physical examples of Einstein's mass-energy equivalence.
 - (e) Compare the wavelength of a photon and electron having (i) Same momentum (ii) Same energy.
 - (f) What was the objective of Davisson-Germer experiment? Discuss the results of this experiment.
 - (g) State Heisenberg uncertainty principle. If the uncertainty in the location of a particle is equal to its de Broglie wavelength, then find out the uncertainty in its velocity.
- 2.** Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) Why the Newton's Rings are circular? Derive expression for the diameter of bright ring.
 - (b) A diffraction grating used at normal incidence gives a line $\lambda_1 = 6000 \text{ \AA}$ in a certain order superimposed on another line $\lambda_2 = 4500 \text{ \AA}$ of the next higher order. If the angle of diffraction is 30° , calculate the number of lines in 1 cm of the grating.
 - (c) Write the condition of secondary maxima for a single slit and show that the intensities of the successive maxima are in the ratio
 $1:1/22:1/61:1/121\ldots\ldots$
- 3.** Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) In Newton's ring experiment, the diameter of 4th and 12th dark rings is 0.4 and 0.7 cm, respectively. Find the diameter of 20th dark ring.
 - (b) The indices of refraction of quartz for right handed and left handed circularly polarized light of wavelength 7620 \AA are 1.53914 and 1.53920 respectively. Calculate the rotation of the plane of polarization of the light in degrees produced by a plate 0.5 mm thick.
 - (c) Discuss the production and detection of plane, elliptically, and circularly polarised light?
- 4.** Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) Mention the essential conditions for lasing action. With the help of suitable diagram, explain the principle, construction and working of Ruby laser.
 - (b) What is holography? Explain recording and reconstruction of a hologram. List some important applications of holography.
 - (c) An optical fibre has NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fibre in water, which has refractive index of 1.33.

5.

Attempt any two parts of the following:

($2 \times 5 = 10$)

- (a) Describe the construction and working of He-Ne Laser. How it is superior to a Ruby laser.
- (b) Describe the Propagation Mechanism of optical signals through optical fiber with suitable ray diagram.
- (c) Explain the following terms:
(i) Numerical aperture
(ii) Acceptance angle
(iii) Acceptance cone

B. Tech. I
 ODD SEMESTER
 MAJOR EXAMINATION 2017 - 2018

Engineering Chemistry

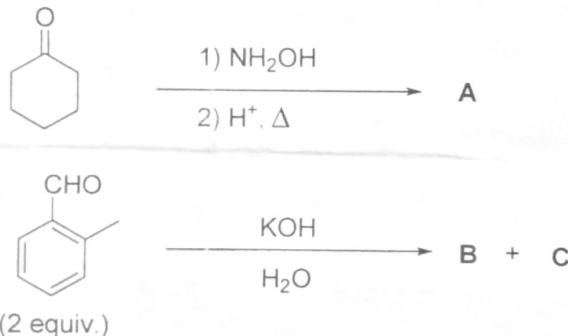
Time: 3 Hrs.

Max. Marks: 50

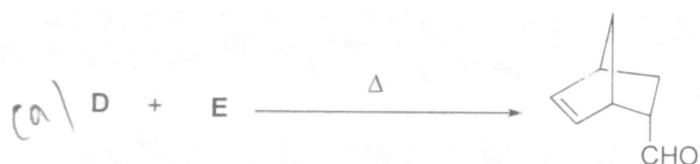
Note: Attempt all questions. Each question carry equal marks.

1. Attempt any four parts of the following: (4 × 2.5 = 10)

- (a) Draw the molecular orbital energy diagram for F_2 molecule. Calculate the bond order.
- (b) Define unit cell. What are the types of unit cell? Derive the Bragg's law equation.
- (c) Define: Phase, Component and Degree of freedom with suitable example.
- (d) Explain the S_N2 reaction mechanism with suitable example. Provide stereochemical outcome of the S_N2 reaction.
- (e) In the following reaction, predict the product(s).



- (f) Predict the structure of starting materials D and E for the following reaction.



2. Attempt any two parts of the following: (2 × 5 = 10)

- (a) What are the characteristics and properties of polymers? Write a note on classification and type of polymers.
- (b) Explain the mechanism of chain polymerization and stereoregular polymerization reaction.
- (c) Differentiate natural rubbers from synthetic rubbers. Provide two examples of synthetic rubbers along with their synthetic route.

- 3.** **Attempt any two parts of the following:** $(2 \times 5 = 10)$
(a) Explain in details about conducting polymers and their applications.
(b) Write a note on synthesis and applications of polyethylene, polypropylene, PVC and PET.
(c) Classify the Fuels. Draw the construction of Bomb calorimeter and explain how it is used for determining the calorific value?
- 4.** **Attempt any two parts of the following:** $(2 \times 5 = 10)$
(a) Write the principle of UV-Visible spectroscopy and give detailed notes on instrumentation of UV-Vis. Spectroscopy. Explain Chomophore and Auxochrome.
(b) Find the NMR signal and no. of splitting: (i) PMMA, (ii) 2,2-Bis(hydroxymethyl) propane-1,3-diol, (iii) Vinyl chloride, (iv) p-Xylene and (v) 2-Methyl-2-propanol
(c) Explain the molecular vibration in IR spectroscopy.
- 5.** **Attempt any two parts of the following:** $(2 \times 5 = 10)$
(a) What is the reason for hardness of water? Explain the different types of hardness. How it affects the human health?
(b) What are the techniques used to soften the water? Explain at least two of them.
(c) What is calgon and explain its applications in water treatment?

Subject code-BAS 03

Roll no.

20190310 67

B.TECH 1ST YEAR

EVEN SEMESTER

MINOR TEST 2019-20

Time- 2 hr

Note: Answer all questions:-

Max. Marks-30

Q.1. Attempt any three parts of the following. Q.1 (a) is compulsory.

- g) (a) is compulsory.

a) What is communication? Explain in brief the process of communication. 4

b) What is meant by Technical Written Communication? Write in brief the relevance of technical written communication.

c) Enumerate the common barriers to effective communication. 3

d) Write a short note on Topic sentence and differentiate between inductive and deductive methods of paragraph development. 3

Q.2. Attempt any three parts of the following. Q.2 (a) is compulsory.

- a) What is LSRW? Write down its relevance in effective communication. 4
 - b) Discuss in detail all the important attributes of language. 3
 - c) What is the 7C's of communication? 3
 - d) Define a sentence. Explicate the essential differences between a loose and a periodic sentence with appropriate examples. 3

Q.3. Attempt any three parts of the following. Q.3 (a) is compulsory.

- a) Answer the following:

 - i. One word substitution-
 - a) a lover of mankind
 - b). a group of worshippers. - ii. Give antonyms-
 - a) Miser
 - b). Wisdom - iii. Synonym of-
 - a) Abhor
 - b) Latent - iv. Offer correct meanings-

P.T.O.

3

i. Suitable preposition-

a). His brother will come _____ Christmas.

b). it is ten minutes _____ twelve.

ii. Insert suitable articles-

a). Give me _____ letter which has been given to you by _____ teacher.

b). I felt _____ bit depressed.

iii. Choose the correct verb-

a). The Indian Hockey team _____ won.(has ,have, will)

b). Smita's mother _____ forty next year.(shall be, will be, is)

c). Discuss the various parts of speech with suitable examples.

3

d) . Describe the various levels of communication.

8

Paper code: BAS-11

Roll no:

2 | 0 | 1 | 9 | 0 | 3 | 1 | 0 | 5 | 9

Course: B.Tech

Year 1st/Semester 2nd

Minor Examination: Session 2019-2020

HUMAN VALUES & PROFESSIONAL ETHICS

Time: 2 hrs.

Maximum Marks: 30

NOTE: ATTEMPT ALL QUESTIONS. Each question carries equal marks.

Q1. Attempt any three of the following. Q.1 (a) is compulsory.

- a. ✓ "Value Education covers all the dimensions and levels of human life and profession." Explain (4)
- b. Define Values? Explain all the essential features and importance. (3)
- c. Discuss the concept of harmony with self and explain 5 essential values which ensure harmony in family. (3)
- d. Explain all the types of values. (3)

Q2. Attempt any three of the following. Q.2 (a) is compulsory.

- a. ✓ Explain the basic concept of 2 basic human aspirations. (4)
Also critically analyze the two in current scenario with examples.
- b. ✓ Explain with example the concept of Self Exploration and SWOT Analysis. (3)
- c. ✓ What do you understand by the value of an entity? (3)
- d. ✓ What is verification at the level of natural acceptance and experimental validation? (3)

Q3. Attempt any three of the following. Q.3 (a) is compulsory.

- a. ✓ List the values which lead to harmony? How important it is to create harmony in society? (4)
- b. ✓ Explain the concept of Environment and Sustainable Development. (3)
- c. ✓ What is harmony in nature? Explain all four orders in detail with examples. (3)
- d. ✓ Explain the concept of existence and co-existence. (3)

Paper Code	BCS-01
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Roll No.	2	0	1	9	0	3	1	0	6	7
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B.Tech. (ECE/ME/EE/CH)

Even Semester (Sem.-II)

Minor Examination 2019-2020

Introduction to Computer Programming

Time: 2 hrs

Max. Marks: 20

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any three of the following; Q.1 (a) is compulsory.

(a) Write an algorithm and draw a flowchart to check the all prim numbers between 1 to 100. 4

(b) Describes the following LINUX commands: 2

lp, ls, pwd, ln, su, vi, ps, init

(c) Differentiate the following: 2

i) log off ii) turn off iii) restart iv) hibernate

(d) Write a program in C to print the following pattern: 2

1

7

2

6

3

5

4

Q.2 Attempt any two of the following; Q.2 (a) is compulsory.

(a) Write C programs to describe the concepts of following: 4

i) break ii) continue iii) goto iv) exit ()

(b) Describe the following:

2

- i) Microcontroller ii) Workstation iii) Minicomputer iv) Supercomputer

(c) Find the output of following programs. Also, show the calculation of each step. 2

i) #include<stdio.h>
void main()
{
const int a = 10;
printf("%d", ++a);
}

ii) #include<stdio.h>
void main()
{
int i;
i = {1, 2, 3};
printf("i = %d\n", i);
}

Q.3 Attempt any two of the following; Q.3 (a) is compulsory.

(a) Write a switch program in which a user types his own ID, if the ID is valid it will ask him to enter his password, if the password is correct the program will print the name of the user, otherwise the program will print Incorrect Password and if the ID does not exist, the program will print Incorrect ID. 4

(b) Find the output of following programs. Also, show the calculation of each step.

i) #include<stdio.h>
void main()
{
static int i=5;
if(--i){
main();
printf("%d ", i);
}

ii) #include<stdio.h>
void main()
{
unsigned char a = -260;
printf (" %d", a);
}

(c) Write a C program to calculate the combination mC_n .

2

Paper code: BAS-11

Roll no: 2 | 0 | 1 | 9 | 0 | 3 | 1 | 0 6 7

Course: B.Tech
Year 1st/Semester 2nd
Minor Examination: Session 2019-2020
HUMAN VALUES & PROFESSIONAL ETHICS

Time: 2 hrs.

Maximum Marks: 30

NOTE: ATTEMPT ALL QUESTIONS. Each question carries equal marks.

Q1. Attempt any three of the following. Q.1 (a) is compulsory.

- ✓ a. "Value Education covers all the dimensions and levels of human life and profession." Explain (4)
- ✓ b. Define Values? Explain all the essential features and importance. (3)
- ✓ c. Discuss the concept of harmony with self and explain 5 essential values which ensure harmony in family. (3)
- ✓ d. Explain all the types of values. (3)

Q2. Attempt any three of the following. Q.2 (a) is compulsory.

- ✓ a. Explain the basic concept of 2 basic human aspirations. (4)
Also critically analyze the two in current scenario with examples.
- ✓ b. Explain with example the concept of Self Exploration and SWOT Analysis. (3)
- ✓ c. What do you understand by the value of an entity? (3)
- ✓ d. What is verification at the level of natural acceptance and experimental validation? (3)

Q3. Attempt any three of the following. Q.3 (a) is compulsory.

- ✓ a. List the values which lead to harmony? How important it is to create harmony in society? (4)
- ✓ b. Explain the concept of Environment and Sustainable Development. (3)
- ✓ c. What is harmony in nature? Explain all four orders in detail with examples. (3)
- ✓ d. Explain the concept of existence and co-existence. (3)

B. Tech.
(Electrical Engineering- 2nd Semester)
Even Semester
Minor Exam 2019-2020
FUNDAMENTALS OF MECHANICAL ENGINEERING

Time: 2 Hour

Max. Marks: 20

NOTE: Answer all questions.

1. Attempt any THREE parts of the following. **Q.1(a) is compulsory.**
 - (a) (i) How the water tube boiler works to make steam? Explain with suitable diagram. (4)
(ii) Differentiate between the COP and efficiency of a system.
 - (b) Compute the internal energy change and temperature change for the two processes (2) involving 1 mole of an ideal monatomic gas.
 - (a) 1500 J of heat are added to the gas and the gas does no work and no work is done on the gas
 - (b) 1500 J of work are done on the gas and the gas does no work and no heat is added or taken away from the gas
 - (c) If a person having two equipment's such as digital watch and Tangent Galvanometer. Which type of measurements method have such kind of examples individually, explain in detail.
 - (d) How the sensors are different from transducers? Explain with different (2) classifications.
2. Attempt any TWO parts of the following. **Q.2(a) is compulsory.**
 - (a) (i) How 2- stroke petrol engines are different from 2-stroke diesel engines. (4)
(ii) Explain the working of 4-stroke petrol engine with suitable diagrams and different important parameters.
 - (b) Describe the working principle of vapor absorption system with neat diagram. (2)
 - (c) Diesel engine has a compression ratio of 14 and cut-off ratio of 1.78. Find the air (2) standard efficiency. Take $\gamma = 1.4$.
3. Attempt any TWO parts of the following. **Q.3 (a) is compulsory.**
 - (a) i. What will be your consideration of choice of an alloy for bearing (4) applications? Explain with suitable properties.

Printed Pages: 02

BME - 02

Roll No. _____

- ii. Explain the different types of cast iron with suitable compositions and properties. (2)
- (b) Explain the given term with suitable diagrams and specifications; (2)
- Slip gauge or Dial gauge
 - Which type of characteristics a refrigerant should be followed during its selection for any refrigerator.
- (c) LVDT is used as an application for which type of sensor OR transducers, Explain in detail. (2)

BME - 02

PL - 117
24

Name of the Course: B. Tech-I year

Even Semester

Minor Examination: 2019-20

Subject Name: Engineering Physics -II**Time: 2 hrs.****Note: Answer all questions.****Max. Marks: 20****Q.1** Attempt any three parts of the following. Q. 1(a) is compulsory.

(a) Sketch the neat and clean structure of Diamond. What type of crystal structure does diamond have? Find its coordination number too. 4

(b) Explain the different physical parameters which are required to construct the crystal structure. Calculate the packing fraction of FCC lattice? 2

(c) Derive the Sabine's formula. 2

(d) Calculate capacitance (C) to produce ultrasonic waves of frequency 2×10^6 Hz with an inductance (L) of 1 H. 2**Q.2** Attempt any two parts of the following. Q. 2(a) is compulsory.(a) Describe the uses of Miller indices. Sketch the planes corresponding to following miller indices separately in the unit cell of simple cubic lattice (121), ($\bar{3}\bar{1}0$), (201), ($\bar{1}\bar{1}\bar{1}$). 4

(b) Construct the Braggs spectrometer? Elaborates the function of its different components. How to determine the crystal structure of NaCl using this. 2

(c) Find the angle between normal to the planes (111) and (121) in a cubic unit cell. 2

Q.3 Attempt any two parts of the following. Q. 3(a) is compulsory.

(a) Describe principle, construction and working of Piezoelectric generator to produce ultrasonic waves. Describe briefly the detection of ultrasonic waves too. 4

(b) Calculate the reverberation time of a hall having its volume 3000 m^3 and the total sound absorption of 80 metric Sabine. Find out the additional sound absorption required for an optimum reverberation. 2

(c) What do you mean by Non-Destructive techniques? Explore its advantages using any NDT method? 2