Roll No. 2 0 1 9 0 2 1 0 3 1

BAS-05

B.Tech.
ODD SEMESTER
Major Examination 2019-2020
Subject Name: Environment & Ecology

Max. Marks: 50

Time: 3 hrs.
Note: Attempt all questions. All questions carry equal marks.

Q.1 Attempt any five of the following.

(a) Define the term mining. Classify the different types of mines. 2

(b) List the benefits related to construction of dam. 2

(c) What are different sources of freshwater? 2

(d) What is eutrophication? 2

(e) Explain energy flow in an ecosystem. 2

(f) What are the different levels of biodiversity? 2

(g) Differentiate between endangered and endemic species.

Q.2 Attempt any two of the following.

(a) What are green house gases? Write down the mechanism of green house effects. Write down the impact of green house gases on the environment? . 5

(b) What is water pollution? What are it's causes? Write down the steps to control water pollution. 5

(c) Define the term waste? Explain in detail the different types of wastes. 5

Q. 3 Attempt any two of the following. 5

(a) Write short note on:
(a) Acid rain
(b) Ozone layer depletion.

(b) What is thermal pollution? What are various causes of thermal pollution? What are its ill effects? 5

(c) What is soil pollution? Explain how modern methods of agriculture are responsible for soil pollution. 5

Q. 4 Attempt any two of the following.

(a) What is population explosion? What are its impacts on the modern day society? 5

(b) Write short note on "Environment Protection Act 1986". 5

(c) What are the issues involved in enforcement of environmental legislation. 5

Q. 5 Attempt any two of the following.

(a) What are NGOs? Write down the role played by NGOs towards the protection of environment. 5

(b) Write short note on "Air (Prevention and Control of Pollution) Act, 1981". 5

(c) What is family welfare programme? List some of the programmes run by the government towards public welfare. 5

BAS01

Roll No. 2 0 1 9 0 2 1 0 3 1

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 $y_n = \frac{(-1)^n n!}{x^{n+1}}\left[\log x - 1 - \frac{1}{2} - \frac{1}{3} \ldots - \frac{1}{n}\right]$, 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

$$\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}} dydx$$

(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

$$\iiint_V x^{l-1}y^{m-1}z^{n-1}dxdydz = \frac{\Gamma l \Gamma m \Gamma n}{\Gamma(l+m+n+1)},$$

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) $\int_0^\infty x^n e^{-a^2x^2}dx = \frac{1}{2a^{n+1}}\Gamma\left(\frac{n+1}{2}\right)$.

P.T.O.

(2× 5 = 10)

3. **Attempt any two parts of the following:**

(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 $k\sqrt{xy}$.

(2× 5 = 10)

4. **Attempt any two parts of the following:**

(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 $(0,0), (\pi,0), \left(\pi,\frac{\pi}{2}\right)$ and $\left(0,\frac{\pi}{2}\right)$.

(b) (i) Evaluate line integral $\int_C (y^2dx - x^2dy)$ 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 $\int_S \vec{F}.\hat{n}dS$ if $\vec{F} = yz\hat{\imath} + zx\hat{\jmath} + xy\hat{k}$ and S is the part of surface $x^2 + y^2 + z^2 = 1$ which lies in the first octant.

(2× 5 = 10)

5. **Attempt any two parts of the following:**

(a) Verify Gauss divergence theorem for $\vec{F} = a(x+y)\hat{\imath} + a(y-x)\hat{\jmath} + z^2\hat{k}$ 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 $F = (x^2 - y^2)\hat{\imath} + 2xy\hat{\jmath}$ 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 $\vec{V} = (x^2 - y^2 + 2xz)\hat{\imath} + (xz - xy + yz)\hat{\jmath} + (z^2 + x^2)\hat{k}$. Find $curl\,\vec{V}$ and also show that vectors given by $curl\,\vec{V}$ at points $(1,2,-3)$ and $(2,3,12)$ are orthogonal.

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

BEE-01

Roll No. 2 0 1 9 0 2 1 0 3 1

B. Tech.
(SEM I) ODD SEMESTER
MAJOR EXAMINATION 2019 - 2020

Principles of Electrical Engineering

Time: 3 Hrs. Max. Marks: 50

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

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

(a) Using Thevenin's theorem, calculate the current flowing through the 4 Ω resistor as shown in Fig. 1.

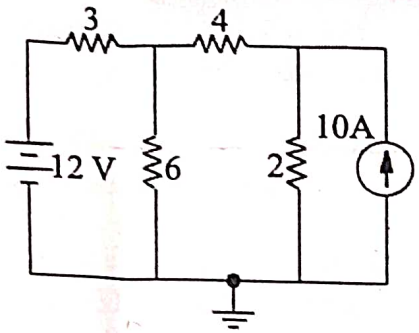

Figure 1

(b) Differentiate between
(i). Linear and Non-linear elements
(ii). Active & Passive elements

(c) The three arms of a three-phase load each comprise an inductor of resistance 25 ohm and of inductance 0.15 H in series with a 120 μF capacitor. The supply is 415 V, 50 Hz. Calculate the line current and the total power in watts, when the three arms are connected in star.

(d) State and proove the Maximum Power Transfer Theorem. Also draw and explain the characteristic between maximum power and load current.

(e) What is the significance of the r.m.s and average values of a wave? Determine the form factor and peak factor of the waveform shown in Fig. 2.

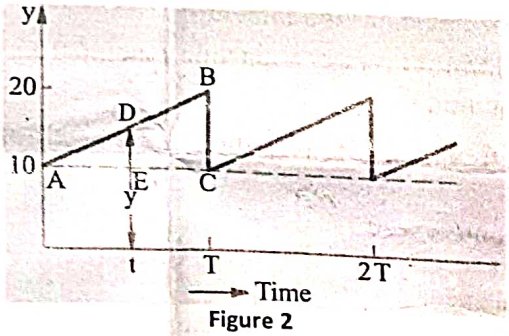

Figure 2

(f) Define the average value of a sinusoidal current. Derive an expression for the average output value for a half wave rectified sinusoidal current waveform.

(g) Discuss resonance in R-L-C parallel circuit. Derive an expression for resonant frequency for R-L-C parallel circuit.

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

(a) Explain the constructional details and working principle, advantage & disadvantage of PMMC instrument. Explain why PMMC type instruments belong to linear scale type instrument.

(b) Explain the working of electro-dynamic type of instruments and describe the construction of electro-dynamic wattmeter.

(c) Explain the principle of operation, construction and the expression for deflection of a moving iron instrument. Why does a MI instrument have non-linear scale? Explain its advantages, disadvantages and application.

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

(a) Explain the working principle of an auto-transformer. State the advantages and disadvantages of an auto-transformer over two-winding transformer. What are the applications of autotransformer?

(b) A 50 *KVA* transformer is operating at 0.95 power factor lagging and 75% of the full load. Find the efficiency of the transformer if the core and copper losses at full load are 900 W and 1200 W respectively.

(c) At 400 V and 50 Hz the total core loss of a transformer was found to be 2400 W. When the transformer is supplied at 200 V, and 25 Hz, the core loss is 800 W. Calculate the hysteresis loss and eddy current loss at 400 V and 50 Hz and also explain hysteresis and eddy-current loss.

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

(a) Derive the expression for torque in a D.C. motor. Draw the torque-Armature current, Speed-Armature current and Torque speed characteristics of following D.C. motor.

(i). D.C. shunt motor
(ii). D.C. series motor

(b) Derive the e.m.f equation of a D.C. generator. What is back e.m.f? Explain the significance of back e.m.f.

(c) The armature of a 200 V D.C. shunt motor is 0.12 ohm. It runs at 600 *rpm* at constant torque load and draws a current of 21 A. Calculate its new speed if the field current is reduced by 10%.

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

(a) What are the different types of induction motors? Explain the principle of operation of three phase Induction motor.

(b) A three phase, 6 pole, 50 Hz induction motor has a slip of 1% at no-load and 3% at full load. Find

(i). Synchronous speed
(ii). No-load speed
(iii). Full-load speed
(iv). Frequency of rotor current at stand still
(v). Frequency of rotor current at full load.

(c) Discuss the working principle of Synchronous motor. State the differences between Synchronous and Induction motor.

BAS-02

Roll No. | 2 | 0 | 1 | 9 | 0 | 2 | 1 | 0 | 3 | 1 |

B. Tech.
(SEMESTER -Ist)
MAJOR EXAMINATION 2019 - 2020
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 was the objective of conducting the Michelson – Morely experiment? Describe the experiment.

(b) Find the speed of 0.1 MeV electrons according to the classical and relativistic mechanics.

(c) Calculate the amount of work done to increase the speed of an electron from 0.6c to 0.8c. Given that the rest-mass energy of electron = 0.511 MeV.

(d) Using the postulates of Special Theory of Relativity, derive the Lorentz Transformation equations.

(e) Derive the time dependent Schrodinger wave equation.

(f) An electron is bound in one dimensional potential box which has the width 2.5×10^{-10} m. assuming the height of the box to be infinite, calculate the two lowest permitted energy values of the electron.

(g) Prove that the de- Broglie wavelength of a particle of rest mass m_0 and charge q, accelerated by a potential difference V is given by

$$\lambda = \frac{h}{\sqrt{(2m_0qV(1+qV/2m_0c^2)}}$$

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

(a) Why the center of Newton's Rings is dark in case of thin air film? What will happen if
- (i) A little drop of water is introduced between the lens and glass plate
- (ii) A plan mirror is used instead of glass plate
- (iii) White light is used

(b) On placing a thin sheet of mica of thickness 1.2×10^{-6} cm in the path of one of the interfering beams in a biprism experiment, it is found that the central bright band shifts a distance equal to the width of a bright fringe. Calculate the refractive index of mica ($\lambda=6\times10^{-5}$ cm).

(c) Calculate the minimum number of lines in a grating which will just resolve the lines of wavelengths 5890 A^0 and 5896 A^0 in the second order.

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

(a) Obtain the expression for the resolving power of grating.

(b) A sugar solution in a tube of length 20 cm produces optical rotation of 13^0. The solution is diluted to one- third of its previous concentration. Find the optical rotation produced by 30 cm long tube containing the diluted solution.

(c) Describe the construction of Nicol prism and show how it can be used as a polarizer or an analyzer.

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

(a) What are the essential requirements for laser action? Discuss the important features of stimulated emission of radiations.

(b) What is holography? Explain recording and reconstruction of a hologram. List some important applications of holography.

(c) An optical fiber core and its cladding have refractive indices of 1.545 and 1.495, respectively. Calculate the critical angle ϕ_c, the acceptance angle $\phi_{c(max)}$, and numerical aperture.

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

(a) Describe the construction and working of Ruby Laser. Point out the limitations of Ruby laser.

(b) Describe the Propagation Mechanism of optical signals through optical fiber with suitable ray diagram.

(c) An optical fiber has a core refractive index $n_1 = 1.36$ and the relative difference in index $\Delta =$ 0.025. find the

(i) Refractive index of cladding, i.e. n_2
(ii) Numerical aperture
(iii) Acceptance angle.

SUBJECT CODE -BAS 03

ROLL NO. | 2 | 0 | 1 | 9 | 0 | 2 | 1 | 0 | 3 | 1 |

BACHELOR OF TECHNOLOGY FIRST YEAR

ODD SEMESTER

MAJOR EXAMINATION2019--2020

PROFESSIONAL COMMUNICATION

Time- 3 Hours **Maximum Marks- 50**

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

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

a)Describe the various aspects of Kinesics in detail.

b)What is formal Communication? Elaborate along with its characteristics.

c)Explain Chronological order of paragraph development and develop a paragraph in the mentioned order.

d)What is interpersonal level of communication? Elucidate in detail.

e)Differentiate between Diagonal and grapevine communication with their flow chart.

f)Discuss the British numeral system and compare it with American numeral system.

g)What are the key features of a language that make it a convenient medium of communication?

Q.2. Attempt any two parts of the following. **(2 x 5 = 10)**

a)What do you mean by Thesis and how it differs from a Dissertation?

b)Prepare your Resume for the post of an assistant Engineer in the General Manager of Reliance Telecom with a covering letter.

c)Mention the various formats of letter writing and discuss one in a detail with the sketch of the layout.

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

a) Write a voluntary special report to the Registrar, MMMUT, Gorakhpur, about the 6^{th} convocation of MMMUT, Gorakhpur highlighting the mismanagement and suggestions of improvement. {300 words}

b) Draft a proposal for the construction of a Creativity Centre for the students of university addressing to the Dean of Students' Affair, MMMUT, Gorakhpur.

c) Illustrate the structure of a thesis with complete description of the various elements.

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

a) Mention the various skills one should exhibit during a professional Presentation.

b) Discuss the role of a leader in an ongoing Professional Group Discussion.

c) Illustrate the significance of planning and rehearsal in a professional Presentation and Interview.

Q.5 Attempt any two parts of the following. **(2 x 5 = 10)**

a) What is an Interview? What precautions one must take while participating in a stressed interview.

b) What is an Extempore? Describe the Do's and Don'ts, a speaker must take in notice during such performances.

c) Catalogue the list of cautions a professional should have in mind while entering in the communication zone of a multicultural and multinational gathering.

Printed Pages:02

BCS-80

Roll No. 2 0 1 9 0 2 1 0 3 1

B. Tech. (CSE)
(SEM-I) ODD SEMESTER
MAJOR EXAMINATION 2019 - 2020

Programming in C

Time: 3 Hrs. **Max. Marks: 50**

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

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

(a) Describe the following with suitable examples:
i) algorithm ii) program

(b) Write a program in C to find an element in the given array using binary search.

(c) Write a program in C to implement the Tower of Hanoi problem using recursion.

(d) Write a program in C to print "hello" without main( ) function. Also, find and discuss the output of following program:

```
#include<stdio.h>
  void main( )
   {
      char  a  =  -262;
       printf("%d",  a);
   }
```

(e) Write a program in C to print the alternate elements of the Fibonacci series upto 200 terms.

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

```
      *           *
    *   *       *   *
  *       *   *       *
*           *           *
```

(g) Define the following:
i) continue ii) return iii) goto iv) exit( )

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

(a) Write a program in C for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

- There are 21 matchsticks.
- The computer asks the player to pick 1, 2, 3, or 4 matchsticks.
- After the person picks, the computer does its picking.
- Whoever is forced to pick up the last matchstick loses the game.

(b) Consider there are 1000 students in a university. Write a C function that takes student details as input and print the details of students having same year of admission. The student details contain student roll number, name, branch, year of admission.

(c) Write a program in C to pass the array elements in a function and print the array elements in the function using pointer.

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

(a) Write a program in C to construct a structure of employee: Structure contains details of employee i.e. employee name, employee Id, year of joining and department. Print the details of employees who belong to CSE department using pointer.

(b) Find and discuss the output of following program. Consider base address of array is *65030* and compiler is 16-bit.

```
#include<stdio.h>
 void main( )
  {
      int    *i,  *j,   **k,   ***l;
      int   arr[117,  103,  1,  50,  14,  8,  111,  13, 170];
      j = &arr[1];   i = &arr[4];   i = i-2;    j = j+3;    k = &j;    l = &k;
      printf("%d%u",  *j,   i);
      printf("%d%u",  ***l,   *&*&k);
  }
```

(c) Write a program in C to print 'Abhishek Kumar Singh' as A. K. Singh.

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

(a) Describe the following:

i) command line arguments ii) pre-processor directives

(b) Write a program in C to implements the malloc( ), calloc( ), realloc( ) and free( ) functions.

(c) Discuss any five graphics programming functions in C with a suitable example.

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

(a) Describe the following:

i) puts( ) ii) putc( ) iii) fputc( ) iv) putchar( ) v) putch( )

(b) Write a program in C to open a file, write in it, and close the file.

(c) Write a program in C to create a link list node and insert it at beginning of the link list.