

BTS – V(SS) – 06.14 – 0508

Reg. No.

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**B.Tech. Degree V Semester Special Supplementary
Examination June 2014**

IT/CS/CE/SE/ME/EE/EB/EC/EI/FT 501 ENGINEERING MATHEMATICS IV
(2006 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A
(Answer ALL questions)

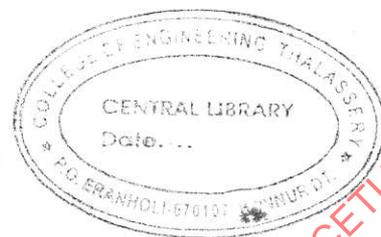
(8 × 5 = 40)

- I. (a) Find the mean and variance of a random variable having density function

$$f(x) = \begin{cases} 12x^2(1-x), & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

- (b) For a binomial distribution with $n = 6$, the third term is nine times the fifth term. Find 'P'.
(c) A random sample of 900 items with mean 3.5 and standard deviation 2.61 is drawn from a normal population. Determine a 95% C.I. for μ .
(d) Briefly explain the procedure for testing of hypothesis.
(e) Prove that $1 + \mu^2\delta^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$.
(f) From the following table find the missing value
x: 2 3 4 5 6
y: 45.0 49.2 54.1 - 67.4
(g) Solve $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ at $x = 0.1$ using Taylor series method.

- (h) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule taking $h = 0.2$.



PART B

(4 × 15 = 60)

- II. (a) Between the hours of 2 and 4 p.m. the average number of phone calls per minute coming into the switch board of a company is 2.5. Find the probability that during one particular minute there will be
(i) no phone call at all
(ii) exactly 2 calls
(iii) at least 5 calls
(b) In a competitive examination 5000 students have appeared for a paper in Statistics. Their average mark was 62 and standard deviation was 12. If there are only 100 vacancies find the minimum marks that one should score in order to get selected.

OR

- III. (a) Find the rank correlation coefficient for the following data
x: 100 101 102 100 100 99 97 98 96 95
y: 98 99 99 97 95 96 95 94 90 96
(b) Fit a good straight line to the following data. Also calculate y when $x = 14$.
x: 10 11 12 13 16 17 20 25
y: 10 22 24 27 29 28 33 37

(P.T.O.)

- IV. (a) A stenographer claims that she can take dictations at the rate of more than 120 words per minute. Of the 12 tests given to her she could perform an average of 135 words with a standard deviation of 40. Is her claim valid? ($\alpha = .01$)
- (b) Ten soldiers visit a rifle range for 2 consecutive weeks. For the first week, their scores are 67, 24, 57, 55, 63, 54, 56, 68, 33, 43 and during second week, they score in the same order 70, 38, 58, 58, 56, 67, 68, 72, 42, 38. Examine, if there is significant difference in their performance.

OR

- V. (a) For a sample of 100 labourers from Kerala, the average daily wages is ₹10.50 with S.D. ₹1.50. For a sample of 150 labourers from Tamil Nadu the corresponding figures are ₹8.00 and ₹1.00 respectively. Can you conclude that average wages of workers in Kerala are more than that of workers in Tamil Nadu?
- (b) The time taken by workers in performing a job by method I and method II are given below:
- | | | | | | | |
|------------|----|----|----|----|----|----|
| Method I: | 20 | 16 | 26 | 25 | 23 | |
| Method II: | 28 | 33 | 42 | 35 | 52 | 34 |
- Does the data show that variance of time distribution by 2 methods do differ significantly?

- VI. (a) Using Stirlings formula find $y(35)$ from the following:
- | | | | | |
|----|-----|-----|-----|-----|
| x: | 20 | 30 | 40 | 50 |
| y: | 512 | 439 | 346 | 243 |

- (b) Evaluate $\int_0^6 \frac{1}{1+x} dx$ using
- (i) Simpson's 1/3 rule
 - (ii) Simpson's 3/8 rule

OR

- VII. (a) Using Lagrange interpolation find $y(10)$ from the following
- | | | | | |
|----|----|----|----|----|
| x: | 5 | 6 | 9 | 11 |
| y: | 12 | 13 | 14 | 16 |

- (b) Find $f'(10)$ and $f''(10)$ from the following:
- | | | | | | |
|--------|---------|-------|-------|--------|--------|
| x | : 10 | 11 | 12 | 13 | 14 |
| $f(x)$ | : 40.62 | 60.80 | 79.95 | 103.56 | 132.65 |

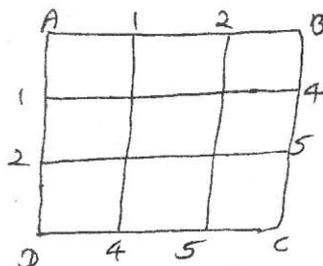
- VIII. (a) Use Range-kutta method to find the value of y when $x = 0.2$ in steps of 0.1 if $\frac{dy}{dx} = x^2 + 2y$, $y(0) = 0$.

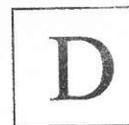
- (b) Solve $U_{xx} - 2U_t = 0$, given $u(0, t) = 0$, $u(4, t) = 0$, $u(x, 0) = x(4 - x)$. Assume $h = k = 1$. Find the values of u upto $t = 5$.

OR

- IX. (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$, with $y = 1$ for $x = 0$. Find y approximately for $x = 0.1$ by Euler's method taking $h = 0.02$.

- (b) Solve the elliptical equation $U_{xx} + U_{yy} = 0$.





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***B.Tech. Degree V Semester Special Supplementary
Examination June 2014***

**EE 502 ELECTRICAL MACHINES II
(2006 Scheme)**

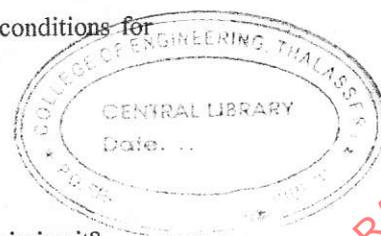
Time : 3 Hours

Maximum Marks : 100

**PART A
(Answer ALL questions)**

(8 x 5 = 40)

- I. (a) State the advantages of using stationary armature and rotating field system in an alternator.
- (b) What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized?
- (c) Explain the effect of armature reaction in alternators for all power factors.
- (d) What do you mean by synchronization of alternators? Give the conditions for synchronization.
- (e) Explain why synchronous motors are not self-starting.
- (f) What are the different losses in a synchronous machine?
- (g) Explain the transient and subtransient reactance of alternators.
- (h) What is meant by hunting in synchronous motor? How will you minimize it?



PART B

(4 x 15 = 60)

- II. (a) Explain the constructional details of an alternator. (7)
- (b) A 3 phase, 8 pole, 750 rpm star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is short-circuited by 2 slots. Find the induced emf between lines, given the flux per pole is 0.06 wb. (8)

OR

- III. (a) Derive emf equation of alternator and explain coil span factor and distribution factor. (7)
- (b) A 50Hz, 3 phase, star connected alternator which generates 10,000V between line on open circuit, has a flux per pole of 15×10^{-2} wb. If the distribution factor of the full pitch is 0.96, find the number of armature conductors in series per phase. (8)

- IV. (a) Explain synchronous impedance of an alternator. (5)
- (b) A 3 phase, star connected, 1000 KVA, 11,000V alternator has rated current of 52.5A. The ac resistance of the winding per phase is 0.45Ω . The test results are given below: (10)

OC test : field current : 12.5A
Voltage between lines : 422V
SC test : field current : 12.5 A
Line current : 52.5A

Determine the full load voltage regulation of the alternator (a) 0.8 pf lagging and (b) 0.8 pf leading.

OR

(P.T.O.)

- V. (a) What is short circuit ratio of an alternator? Explain the significance of SCR. (5)
- (b) A 2000 KVA, 3 phase, 8 pole alternator runs at 750 rpm in parallel with other machines on 6000V bus bars. Find the synchronizing power on full load 0.8 pf lagging per mechanical degree of displacement and the corresponding synchronizing torque. The synchronous reactance is 6 Ohms per phase. (10)
- VI. (a) Derive an expression for the power developed in a 3 phase synchronous motor. (7)
- (b) A 500V, 1 phase synchronous motor gives a net output mechanical power of 7.46 KW and operates at 0.9 pf lagging. Its effective resistance is 0.8Ω . If the iron and friction losses are 500W and excitation losses are 800W, estimate the armature current. Calculate the commercial efficiency. (8)
- OR**
- VII. (a) Explain the operation of a synchronous motor under constant excitation and varying load. (7)
- (b) A 2.3 KV, 3p star connected synchronous motor has $Z_s = (0.2 + j2.2)$ ohms per phase. The motor is operating at 0.5 power factor leading with a line current of 200A. Determine the generated emf per phase. (8)
- VIII. (a) Derive an expression for power developed in a salient pole synchronous machine. Give expression for reluctance power. Draw power versus power angle diagram. (9)
- (b) Discuss the effect of short circuit on alternators. (6)
- OR**
- IX. (a) Derive the expression for time period of oscillation of a synchronous machine. (7)
- (b) A 10,000KVA, 4 pole, 6600V, 50HZ, 3 phase star connected alternator has a synchronous reactance of 25% and operates on constant voltage, constant frequency bus bars. If the natural period of oscillation while operating at full load and unity power factor is to be limited to 1.5 second. Calculate the moment of inertia of the rotating system. (8)

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**B.Tech. Degree V Semester Special Supplementary
Examination June 2014**

**EE 503 FIELD THEORY
(2006 Scheme)**

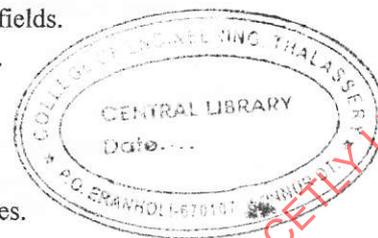
Time : 3 Hours

Maximum Marks : 100

**PART A
(Answer ALL questions)**

(8 × 5 = 40)

- I. (a) Express the vector $\vec{B} = \frac{10}{r^2} \hat{r} + r \cos \theta \hat{\theta} + \hat{\phi}$ in Cartesian and Cylindrical co-ordinate systems.
- (b) Obtain the expression for the variation of electric flux density vector D with radius, for a uniformly charged sphere with radius ' a ' and plot the variations.
- (c) Establish the existence of displacement current in electromagnetic fields.
- (d) Deduce Maxwell's equations for static electric and magnetic fields.
- (e) Derive the vector wave equation for a lossy dielectric.
- (f) Distinguish between phase velocity and group velocity.
- (g) What is Snell's law of reflection?
- (h) Compare single stub and double stub matching for transmission lines.



PART B

(4 × 15 = 60)

- II. Determine the flux of $\vec{D} = \rho^2 \cos^2 \phi \hat{\rho} + z \sin \phi \hat{\phi}$, over the closed surface of the cylinder, $0 \leq z \leq 1, \rho = 4$. Verify Divergence theorem for this case. (15)

OR

- III. (a) A point charge of 30nC is located at the origin, while a plane $y = 4$, carries a charge of $10\text{nC}/\text{m}^2$. Find \vec{D} at (0,3,4). (7)
- (b) Given that $\vec{E} = (3x^2 + y)\hat{x} + x\hat{y}$ kV/m, find the work done in moving a -2nC charge from (0,5,0) to (2,-1,0). (8)

- IV. (a) State and explain Biot-Savart's law. (5)
- (b) Show that ' \vec{H} ' at a distance ' h ' on the axis of a circular current loop of radius ' ρ ' is $\vec{H} = \frac{I\rho^2}{2(\rho^2 + h^2)} \hat{z}$ (10)

OR

- V. (a) \vec{E} and \vec{H} can hardly propagate through good conductors. Justify. (5)
- (b) Find the skin depth ' δ ' of a 5GHz EM wave through aluminium, where ' $\sigma = 38.2 \times 10^6$ seimens/m and $\mu_r = 1$ '. (10)

(P.T.O)

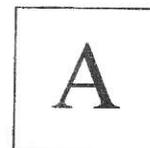
- VI. (a) State and prove Poynting theorem in electromagnetic wave propagation. (10)
(b) What is Brewster angle? Mention its significance. (5)
- OR**
- VII. (a) Compare a transmission line and a wave guide. (5)
(b) Briefly discuss the different modes of propagation in a rectangular waveguide. Also mention the dominant mode. (10)
- VIII. (a) From the lumped element model of a transmission line, arrive at an expression for propagation constant in terms of transmission line parameters. (7)
(b) Obtain the expression for input impedance of a transmission line. Why is a quarter wave line called an impedance transformer? (8)
- OR**
- IX. Explain Smith chart and mention the steps for single stub matching with the help of Smith chart. (15)

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***B.Tech. Degree V Semester Special Supplementary
Examination June 2014***

EE 504 ELECTRICAL MATERIAL SCIENCE
(2006 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A
(Answer *ALL* questions)

(8 × 5 = 40)

- I. (a) Explain Fermi Dirac distribution.
(b) Write a short note on materials used in instruments and relays.
(c) Write a short note on liquid insulators.
(d) List out the factors influencing the dielectric strength of materials.
(e) Write a short note on sintered alloys used in breakers.
(f) List out some alloys for switch contacts.
(g) Explain briefly about ferromagnetic resonance.
(h) Write a short note on electron spin resonance.

PART B

(4 × 15 = 60)

- II. Explain
(a) Diamagnetism
(b) Paramagnetism
(c) Ferromagnetism
- OR
- III. Explain
(a) Hard and soft magnetic materials.
(b) Amorphous semi conductors.
- IV. Explain
(a) Ionic polarization
(b) Dipolar polarization
(c) Electronic polarization in dielectrics.



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- V. (a) Discuss in detail the mechanism of breakdown in gases, liquids and solids. (10)
(b) Mention the properties of SF_6 . (5)
- VI. Explain (15)
(a) Cold mirror coating
(b) Heat mirror coating
(c) Anti reflection coating
- OR
- VII. Write short notes on materials used for (15)
(a) Solar cells
(b) Fuel cells
(c) Battery
- VIII. Explain electron microscopy with a neat sketch. (15)
- OR
- IX. Explain atomic absorption spectroscopy with a neat sketch. (15)

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**B. Tech. Degree V Semester Special Supplementary
Examination June 2014**

**EE 505 MICROPROCESSOR BASED SYSTEMS
(2006 Scheme)**

Time: 3 Hours

Maximum Marks: 100

**PART A
(Answer ALL questions)**

- I. (a) Write a note on assembler directive of 8086. (8 x 5 = 40)
(b) Explain segment registers of 8086.
(c) Write a note on READY input and WAIT states.
(d) Describe various internal registers and their usage of 8259.
(e) Explain DMA transfer and operations of 8086.
(f) Comment the usage of descriptor table.
(g) Write a note on register banks of 8051.
(h) Compare microcontroller with microprocessor.

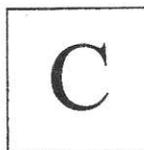


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PART B

- II. Explain the architecture of 8086 with the help of block diagram. (15)
OR
III. Explain minimum mode and maximum mode operation of 8086 with the help of diagrams. (15)
IV. Explain the architecture of 8255 with the help of block diagrams. (15)
OR
V. Explain architecture and features of 8257 with a block diagram. (15)
VI. (a) Write a note on 80386 protected mode operation. (6)
(b) Explain: (i) branch prediction logic (9)
(ii) super scalar architecture
OR
VII. Explain the architecture of intel 80386 processor with the help of block diagram. (15)
VIII. Explain architecture of 8051 with the help of diagram. (15)
OR
IX. (a) Explain addressing modes of 8051. (7)
(b) Write a 8051 program to move the contents of internal RAM memory from 30h – 37h to Bank 0 using MoV instruction only. (8)

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**B.Tech. Degree V Semester Special Supplementary
Examination June 2014**

**EE 506 LINEAR INTEGRATED CIRCUITS
(2006 Scheme)**

Time : 3 Hours

Maximum Marks : 100

PART A
(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Explain the concept of visual ground.
- (b) Explain frequency response compensation in opamp.
- (c) Compare inverting and noninverting amplifier.
- (d) Define CMRR. An opamp's typical CMRR is 110 dB for change in common mode voltage of 12V. What is change in offset voltage?
- (e) State the significance of compensating resistor R_{COMP}. Illustrate its design.
- (f) Explain sample and hold circuit.
- (g) Explain PLL.
- (h) Explain all pass filter.

PART B

(4 × 15 = 60)

- II. Derive the expression for voltage gain, input impedance and output impedance of dual input balanced output differential amplifier with neat diagram. (15)

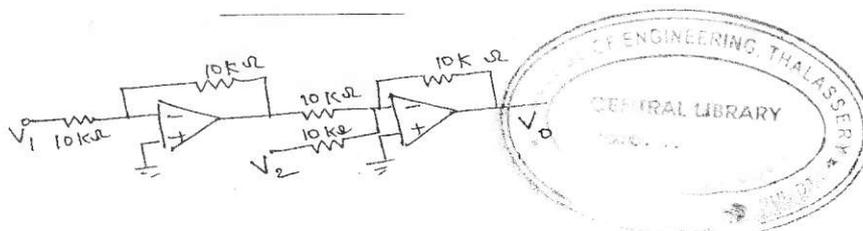
OR

- III. (a) Draw the block diagram representation of typical opamp and describe the function of each block. (10)
- (b) List any five characteristics of an ideal opamp. (5)

- IV. Draw the circuit and derive the expression for overall gain of an instrumentation amplifier. (15)

OR

- V. Calculate V_o for the circuit given below. (15)
 $V_1 = 5V; V_2 = 2V;$



- VI. With neat diagram and waveform explain
(i) Triangular wave generator (7)
(ii) Monostable multivibrator. (8)

OR

- VII. (a) Explain in detail about wein bridge oscillator (10)
(b) Explain the internal block diagram of IC 723 with a neat diagram. (5)

- VIII. (a) Explain the working of DAC with R-2R resistors and compare with binary weighted resistor type DAC, (8)
(b) Design a second order Butterworth low pass filter at a high cut off frequency 1K Hz. (7)

OR

- IX. (a) Draw the internal block diagram of 555 timer IC. (7)
(b) Discuss the operation of 555 timer as astable multivibrator, with neat internal circuit diagram. (8)