M 18598

Reg. No. : .....

Name : .....

V Semester B.Tech. Engineering Degree (Regular/Supplementary/ Improvement Including Part Time) Examination, January 2011
PT 2K6/2K6/CE/ME/EE/EC/CS/IT/AEI501 : ENGINEERING MATHEMATICS – IV

Time: 3 Hours Max. Marks: 100

Instructions *: i) Answer* ***all*** *questions.*
ii) ***Assume*** *suitable data that are not given.*

I. a) Define discrete random variable. The probability distribution of a finite random variable X is given by the table : **5**

X	0	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K	13K

Find :

i) Value of K

ii) $P(X < 4)$

iii) $P(3 < X \leq 6)$.

b) Derive the variance of uniform distribution. **5**

c) Explain with example : **5**

i) Null hypothesis

ii) Level of significance.

d) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing do the data indicate an unbiased die ? **5**

P.T.O.

e) Using the generating function prove that, **5**

$$P_n(0) = \begin{cases} (-1)^{n/2} \dfrac{1.3.5.....(n-1)}{2.4.6.....n}, & n \text{ is even} \\ 0 & \text{when n is odd} \end{cases}$$

f) Prove that $J_{1/2}(x) = \sqrt{\dfrac{2}{\pi x}} \sin x$. **5**

g) If F(s) is the complex Fourier transform of f(x), then prove that **5**

$$F\{f(ax)\} = \frac{1}{a} F\left(\frac{s}{a}\right), a \neq 0.$$

h) If F (s) is the complex Fourier transform of f(x), then prove that **5**

$$F\{f(x)\cos ax\} = \frac{1}{2}\{F(s+a) + F(s-a)\}.$$

II. a) Derive mean and variance of exponential distribution. **7**

b) In 800 families with five children each, how many families would be expected to have **8**

i) 3 boys and 2 girls

ii) 2 boys and 3 girls

iii) Atmost 2 girls by assuming probabilities of births of boys and girls to be equal ?

OR

c) The length of a telephone conversation has an exponential distribution with a mean of 3 min. Find the probability that a call : **7**

i) Ends in less than 3 min.

ii) Takes between 3 and 5 min.

iii) More than 3 min.

d) Derive mean and variance of binomial distribution. **8**

III. a) It is guaranteed that a 4-litre can of a wall paint covers 57 square meters on the average with a standard deviation of 3.5 square meters. Find the probability that the total area covered by a sample of 40 of these 4-litre cans will be between 2200 and 2300 square meters. **7**

b) A set of 5 similar coins is tossed 320 times and the result is : **8**

No. of heads :	0	1	2	3	4	5
Frequency :	6	27	72	112	71	32

Test the hypothesis that the data follow a binomial distribution for

$v = 5$, $\chi^2_{0.05} = 11.07$.

OR

c) If the mean of an infinite population is 575 with standard deviation of 8.3, how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 572 ? **7**

d) A die is thrown 270 times and the results of these throws are given below : **8**

No. appeared on the die:	1	2	3	4	5	6
Frequency :	40	32	29	59	57	59

Test whether the die is biased or not.

IV. a) Show that $P_n(x)$ is the coefficient of t^n in the expansion of

$(1 - 2xt + t^2)^{-1/2}$. **8**

b) Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \left\{ \frac{3 - x^2}{x^2} \sin x - \frac{3}{x} \cos x \right\}$. **7**

OR

c) Show that $J_n(x) = \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)\,d\theta$, n being an integer. **8**

d) Express $x^3 + 2x^2 - 4x + 5$ in terms of Legendre polynomial. **7**

V. a) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$

hence evaluate $\int_0^{\infty} \frac{x\cos x - \sin x}{x^3} \cos\frac{x}{2}\,dx$. **8**

b) Find the nature of the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$. **7**

OR

c) Reduce $3x^2 + 3z^2 + 4xy + 8xz + 8yz$ into canonical form. **8**

d) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$. **7**

M 18599

Reg. No. : .....

Name : .....

Fifth Semester B.Tech. Engineering Degree (Regular/Supplementary/ Improvement including Part Time) Examination, January 2011
PT2K6/2K6/CE/ME502 : ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Time: 3 Hours Max. Marks: 100

Instruction: *Answer* ***all*** *questions.*

1. a) What is meant by natural resources ? Enumerate the various natural resources.
   b) Discuss the importance of forest. What are its economical aspects ?
   c) Distinguish among genetic diversity, species diversity and ecosystem diversity.
   d) Discuss the functions of an ecosystem.
   e) Define air pollution. Write its effect on human health and buildings.
   f) Briefly explain concept of disaster management.
   g) Define sustainable development and discuss its concepts.
   h) What is ozone hole ? How does it form ? Mention its effects. **(8×5=40)**

2. a) Discuss the importance of environmental studies.
   b) Explain the scope and importance of environmental studies. What is meant by ecosystem and biodiversity ? **(7+8=15)**

   OR

   c) Discuss as to how awareness for safe environment can be inculcated in individuals and public.
   d) How do the dams influence the quality of life, human settlements and agricultural land ? **(7+8=15)**

3. a) Describe the uses and importance of biodiversity.
   b) Describe the structure, salient features and functions of a forest ecosystem. **(7+8=15)**

   OR

   c) Explain 'in situ and ex situ' approaches of conservation of biodiversity. Compare their advantages and disadvantages and limitation. **15**

P.T.O.

4. a) What are solid wastes and what their different types ? Discuss their effect.

   b) What is disaster management ? Write details about management. **(7+8=15)**

   OR

   c) Write brief note on man made disasters.

   d) What are the main features of the Environmental Protection Act ? **(7+8=15)**

5. a) Discuss the causes and effects of global warming.

   b) What is meant by 'value and value education' ? Discuss their concept with the help of suitable illustrations. **(7+8=15)**

   OR

   c) Briefly explain the following :

      i) Population explosion

      ii) Nuclear accidents

      iii) Acid rain. **(3×5=15)**

M 18608

Reg. No. : .....

Name : .....

V Semester B.Tech. Engineering Degree (Regular/Supplementary/ Improvement including Part Time) Examination, January 2011
PT 2K6 / 2K6 EE 503 : FIELD THEORY

Time: 3 Hours Max. Marks: 100

Instruction : *Answer* ***all*** *questions.*

PART – A

I. a) Explain the term curl of a vector.

b) Derive an expression to obtain the capacitance of an isolated of sphere.

c) Derive the Lorentz force equation.

d) Explain magnetic boundary conditions.

e) Obtain the Maxwell's equation in point form.

f) Explain the concept of plane wave in good conducting medium.

g) State and explain the law of refraction.

h) Derive an expression for characteristic impedance in electromagnetic wave. **(8×5=40)**

PART – B

II. a) State and explain divergence theorem. **6**

b) Find the electric field intensity at a point (0, 0, 5) mt due to two charges $Q_1 = 0.35\,\mu$ coulomb at (0, 4, 0) mt and $Q_2 = -0.55\ \mu C$ at (3, 0, 0) mt. **9**

OR

c) Write a note on electric dipole moment. **7**

d) Find the work done in moving a charge of +2 coulomb from (2, 0, 0) mt to (0, 2, 0) mt along the straight line path joining the two points, if the electric field intensity is $\vec{E} = (12x\hat{x} - 4y\hat{y})$ V/mt. **8**

P.T.O.

III. a) State and explain Ampere's circuital law. **6**

b) A circuit carrying a direct current of 5 A from a regular hexagon inscribed in a circle of radius 1 mt. Calculate the magnetic flux density at the centre of current hexagon. Assume the medium to be free space. **9**

OR

c) Derive an expression for lifting power of a magnet. **6**

d) A solenoid of 10 cm diameter and 30 cm length is wound with 150 turns and carries a current of 5 A. Find the magnetic flux density at a point on the axis at a distance of 10 cm from the mid point of the solenoid. **9**

IV. a) Obtain Maxwell's equation in integral form. **7**

b) Two infinitely long and parallel wires carry currents $(I_1 - I_2) = I$ in opposite directions. They are separated by a distance of 17.32 cm. If the magnetic field intensity at point which is 10 cm from one wire and 20 cm from the other is 13.783 A/mt, determine the value of I. **8**

OR

c) Explain the propagation of plane in lossy dielectric medium. **7**

d) A uniform plane wave with an intensity of electric field equal to 1 volt/mt is travelling in free space. Find the magnitude of associated magnetic field. **8**

V. a) Explain the concept of polarization in electromagnetic waves. **7**

b) Calculate the attenuation constant and wave velocity in sea water for uniform plane wave in 1 GHz. The constants for sea water are $\epsilon_r = 80, \mu_r = 1$ and $\sigma = 4 \text{s/mt}$. **8**

OR

c) Explain the terms

i) Impedance matching and

ii) Stub matching. **8**

d) Explain the transmission of plane waves at boundaries. **7**

M 18609

Reg. No. : .....

Name : .....

V Semester B. Tech. Engg. Degree (Regular/Supplementary/Improvement including Part Time) Examination, January 2011
PT2K6/2K6 EE 504 : ELECTRICAL MACHINES – II

Time: 3 Hours Max. Marks: 100

***Instructions** : Answer **all** the questions.*

PART – A

I. a) Derive the e.m.f. equation of a Synchronous Generator.

b) Write a note on transient and subtransient reactances.

c) Draw the power angle curve of a non-salient pole type machine.

d) Write a note on effect of load changes on synchronous motor.

e) Obtain an expression for frequency of rotor current in terms of slip.

f) Explain cogging and crawling in induction motor.

g) Explain slip power recover scheme in induction motor.

h) Explain the working capacitor start and run single phase induction motor. **(8×5=40)**

PART – B

II. a) Explain M.M.F. method of finding out regulation in an alternator. **7**

b) A 3 phase, 16 pole, synchronous generator has a star connected winding with 144 slots and 10 conductors for slot. The flux per pole is 0.03 wb. sinusoidally distributed and the speed is 375 r.p.m. Calculate the line induced e.m.f. **8**

OR

c) Derive an expression for power developed in salient pole synchronous machine. **8**

d) With connection diagram, explain slip text to determine Xd and Xq. **7**

III. a) Describe a method to obtain V and inverted V curves of a 3 phase synchronous machine. **7**

b) Two single phase alternators are connected in parallel and supply current to a load at a terminal voltage of 10,000 $\underline{|0^\circ}$ volts. Alternator A has an induced e.m.f. of 13,000$\underline{|22.6^\circ}$ V and a reactance of 2Ω. Alternator B has an e.m.f. of 12,500 $\underline{|36.9^\circ}$ V and a reactance of 3Ω. Find the current supplied by each machine. **8**

OR

c) With diagram, explain why synchronous motor is not self strarting. **7**

d) A 400 volts, 10 H.P., 3 phase synchronous motor has negligible armature resistance and a synchronous reactance of 10 Ω/phase. Determine the minimum armature current and the corresponding e.m.f. for full load condition. Assume an efficiency of 85%. **8**

IV. a) Obtain torque-slip characteristics of a 3 phase induction motor. **7**

b) A 6 pole, 3 phase, 50 Hz induction motor B running at full load with a slip of 4%. The rotor is star connected and its resistance and stand still reactances are 0.25 Ω and 1.5 Ω/phase. The e.m.f. between sliprings is 1000 volts. Find the rotor current perphase and power factor assuming the sliprings are shortcircuited. **8**

OR

c) With diagrams, explain no-load and blocked rotor tests in an induction motor. **8**

d) A 3 phase, 8 pole, 50 Hz, I.M. running with a slip of 4% is taking 20KW. Stator lanes amount to 0.5 KW. If the mechanical torque lost to friction is 16.25 NW. mt., find the efficiency. **7**

V. a) With diagram, explain rotor resistance starting in 3 phase induction motor. **7**

b) The ratio of maximum torque to full load torque in a 3 phase squirrel cage I.M. is 2.5. Calculate the ratio of starting torque to full load torque to full load torque for direct on-line starting . The rotor resistance is 0.5 Ω/phase and rotor stand still reactance is 5 Ω/phase. **8**

OR

c) Explain the double field revolving theory in single phase induction motor. **8**

d) A 4 pole, 250W, 115 V, 60 Hz capacitor start. Induction motor takes a full load current of 5.3 A. While running at 1760 r.p.m. If the full load efficiency of the motor is 64%, find its full load torque. **7**

M 18610

Reg. No. : .....

Name : .....

Fifth Semester B.Tech. Engineering Degree (Regular/Supplementary/Improvement including Part Time) Examination, January 2011

PT2K6/2K6 EE 505 : MODERN COMMUNICATION SYSTEMS

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

1. a) Explain pulse position modulation scheme.
   b) What is Ask ? Explain.
   c) With the help of a neat diagram explain interlaced scanning.
   d) Write a short note on tracking radars.
   e) Explain practical handoff considerations in brief.
   f) Explain the principle of operation of LED.
   g) Explain Geostationary orbit.
   h) Write a short note on special spectrum communication. **(8×5=40)**

2. a) With the help of a neat block diagram and waveforms explain the working of a DPCM. **8**
   b) With block diagram, explain the working of a superheterodyne receiver. **7**

OR

3. a) Explain wavelength division multiplexing. **7**
   b) Explain the working of a foster seeley discrimination used for FM demodulation. **8**

4. a) With the help of a neat block diagram explain the operation of a monochrome TV Receiver. **10**
   b) Write a short note on PAL color system. **5**

OR

P.T.O.

5. a) With the help of a block diagram explain the operation of a pulse radar. **10**

   b) Write a short note on moving target indicator. **5**

6. Explain :

   a) Multimode step index fibre

   b) Single mode step index fibre. **15**

OR

7. a) Explain the call blocking in cellular networks. **8**

   b) Explain the principle of operation of LASER diode. **7**

8. a) Discuss briefly how demand assignment may be implemented in a TDMA network. What is the advantage of TDMA over FDMA in this respect ? **8**

   b) Distinguish between bandwidth limited and power limited operations as applied to FDMA networks. **7**

OR

9. a) What is the function of :

   i) the burst code word

   ii) the carrier and bit-timing recovery channel in a TDMA burst. **8**

   b) With the help of a block diagram explain the working of a frequency hopping transmitter. **7**

M 18611

Reg. No. : .....

Name : .....

V Semester B.Tech. Engg. Degree (Regular/Supplementary/Improvement Including Part Time) Examination, January 2011
PT 2K6/2K6 EE 506 : POWER SYSTEMS – I

Time: 3 Hours Max. Marks: 100

Instructions : *Answer* ***all*** *questions.*
Missing data may be ***suitably*** *assumed.*

1. a) Explain how the cost of electrical energy is expressed. 5
   b) Explain the method of power factor improvement with suitable vector diagram. 5
   c) List and explain the properties of conductor materials used for transmission and distribution of electrical power. 5
   d) What is sag in overhead lines ? Explain. 5
   e) What is skin effect ? Explain. 5
   f) Write a note on constants of a transmission line. 5
   g) Explain how the overhead transmission lines are classified. 5
   h) With one line diagram explain typical low tension distribution system. 5

2. a) What is depreciation ? Explain how depreciation is calculated using diminishing value method. 9
   b) A distribution transformer costs Rs. 2,00,000 and has a useful life of 20 years. If the salvage value is Rs. 10,000 and rate of annual compound interest is 8%, calculate the amount to be saved annually for replacement of the transformer after the end of 20 years by sinking fund method. 6

   OR

   c) What is energy tariff ? Explain the types of tariff. 10
   d) A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 50 paise per kWh, find the overall cost per kWh. 5

P.T.O.

3. a) What is string efficiency ? Derive an expression to calculate the percentage string efficiency. **8**

   b) Explain the methods of improving string efficiency. **7**

   OR

   c) Derive an expression to calculate sag when **9**

      i) Supports are at equal levels ii) Supports are at unequal levels.

   d) A transmission line has a span of 150 m between level supports. The conductor has a cross-sectional area of $2cm^2$. The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is 9.9 gm/cm^3 and wind pressure is 1.5 kg/m length. Calculate the sag. **6**

4. a) Derive an expression for loop inductance of a single phase line. **9**

   b) A single phase line has two parallel conductors 2 metres apart. The diameter of each conductor is 1.2 cm. Calculate the loop inductance per km of the line. **6**

)R

   c) What is generalised circuit constants of a transmission line ? From the fundamentals evaluate the generalised circuit constants for **9**

      1) Short line and

      2) Medium line-nominal T method.

   d) What is the maximum length in km for a 1-phase transmission line having copper conductor of 0.775 cm^2 cross-section over which 200 kW at unity power factor and at 3300 V are to be delivered ? The efficiency of transmission is 90%. Take specific resistance as 1.725 $\mu\Omega$. **6**

5. a) With one line diagram explain the following connection schemes of distribution system : **10**

      i) Radial system ii) Ring main system.

   b) Write a note on requirements of a distribution system. **5**

   OR

   c) Explain the method of 3 wire D.C. system. **8**

   d) A 3 wire 500/250 V D.C. system has load of 35 kw between the positive lead and the middle wire and a load of 20 kW between the negative lead and the middle wire. If there is a break in the middle wire, calculate the voltage between the outers and the middle wire. **7**