Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Electromagnetic fields & waves   Semester: IV
Program: B.Tech Electronics and Communication Engineering   Time 03 hrs.

Course Code: ECEG 2035   Max. Marks: 100

Instructions:

1. **Attempt all the questions (Theory, Numerical, Case study etc.) on A4 size blank sheets.**
2. **Attempt all questions serially as per question paper.**
3. **Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.**
4. **Scan the whole answer script and check the resolution carefully before upload on the blackboard. Note that answer scripts will be considered for evaluation only through Blackboard. No other mode of submission is acceptable.**
5. **You are expected to be honest about each attempt which you make to progress in life**

SECTION A [Case Based Study/design] 40 Marks(answer any two)

S. No.		Marks	CO
Q 1	Find D, E and H using maxwell's equation for given $\rho_v = \rho_0 (e^{-j\beta r})$. Find the power transmitted using pointing theorem.	20	CO2
Q 2	A transmission line has R= 5 ohms/m, L=5.2 x10^{-8} H/m, G=6.2 mmho/m, C=213 pF/m. The signal frequency is 4 GHz. Calculate the characteristic impedance, propagation constant of the wave along the line, reflection coefficient if the load is 100 + j100, SWR, Zmax and Zmin sending end impedance if the electrical length of the line is 75 deg.	20	CO3
Q 3	Region1 for which μr1 =2 is defined by x<0 and μr2 =4 for x>0. Given H1 =6 **i**+4.5**j**-9 **k** A/m. Show that θ2=19.7 deg and H2 =7.12 A/m. Find also E and D.	20	CO1

SECTION B [Numerical and Short/broad Answers] 60 Marks (Answer any six)

Q 4	Derive the wave equation in conducting media.	10	CO2
Q5	Derive the field expressions for TE modes in parallel plate waveguide.	10	CO4
Q 6	State and Derive the Maxwell's equation for time varying fields and explain their physical interpretation.	10	CO1

NOTE : The submission time of the Question Paper Answer Sheet is 24 Hhrs from the scheduled time (*exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).

No Submission will be entertained after 24 Hrs

Q 7	Derive the input impedance of the transmission line of Z0, length 'l' and terminated with Zl.	10	CO3
Q 8	a). Derive the expression for Z_0, Vp and γ for distortionless lines.	5	CO3
Q 8	b).Explain Surface Impedance in conductors and deduce the expression for it	5	CO2
Q 9	a).Explain how TM_0 mode is TEM in Parallel plate waveguide.	5	CO4
Q9.	b). Find the D for the region between the two concentric right circular cylinders which is filled with dielectric material of relative dielectric constant =2.2, where V=0 at r=1mm and V=20 volts at r=20 mm. Solve by laplace's equation.	5	CO1
Q10.	Design single stub matching network for the transmission line of Z0=50 ohms terminated with Zl=100+j100 ohms. Find SWR and Reflection Coeff.	10	CO3

NOTE : The submission time of the Question Paper Answer Sheet is 24 Hhrs from the scheduled time (*exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
No Submission will be entertained after 24 Hrs