ABSTRACTS

DEPARTMENT OF POWER ENGINEERING

Electrical Enginneering

1. APPLICATION OF A.C. NETWORK ANALYZER FOR SHORT CIRCUIT AND RELAY STUDIES OF POWER SYSTEMS. H. N. Ramachandra Rao, *Power Engineer*, January 1954.

Short circuit and Relay studies play a vital role in Power System planning and an A.C. Network Analyzer is ideally suited for studying such problems especially when a system network is large and complicated. The article shows how the Analyzer could be used for the determination of the ratings of circuit breakers and the settings of the relays. The method of preparing system data for different types of fault is also briefly discussed.

Civil and Hydraulics Engineering

1. THE ROLE OF CIVIL AND HYDRAULIC ENGINEERING LABORATORIES IN WATER POWER DEVELOPMENT. Prof. N. S. Govinda Rao, *Power Engineer*, Oct. 1953, 3, No. 4, 216–21.

The paper discusses the utility of (*a*) structures and materials testing laboratory and experimental stress analysis laboratory; (*b*) Concrete laboratory; (*c*) Soil Mechanics laboratory; and (*d*) Hydraulic laboratory for carrying on investigations on the several components of any Water Power Development Project, which include dams, regulators, gates and sluices, turbines, etc.

2. UNDERGROUND HYDRO-ELECTRIC POWER STATIONS. K. Seetharamiah, *Indian Journal of Power and River Valley Development*, September 1953, 3, No. 9, 5–13.

Tracing the history of underground power station development, the paper treats in detail the advantages and disadvantages of underground power stations, modern techniques in Tunnelling, construction features and the scope of underground hydro power stations in India.

3. RECENT TRENDS IN NON-DESTRUCTIVE TESTING OF CONCRETE. K. T. Sundara Raja Iyengar, *Indian Concrete Journal*, Dec. 1953, 27, No. 12, 456–60.

After mentioning the disadvantages of the existing destructive methods of testing, the paper discusses in detail, the theory, fields of application and limitations of some of the recent non-destructive methods of testing of concrete which include the Resonant frequency or Sonic method, Pulse techniques and density measurements using Gamma Radiation.

DEPARTMENT OF ELECTRICAL COMMUNICATION ENGINEERING

1. A TRIGONOMETRIC SERIES USED IN PHYSICAL PROBLEMS. S. K. Lakshmana Rao and B. S. Ramakrishna, *Nature*, 1953, **171**, 308.

2. EXPERIMENTAL INVESTIGATIONS OF NOISE ASSOCIATED WITH MODULATED PULSES. V. Narayana Rao, *Proc. Ind. Acad. Sci.*, 1953, **38**, 184.

SUMMARY

The theory of noise associated with pulses is considered from the point of view of application to the study of noise in pulse communication. The process of slicing and its effect on the signal to noise ratio are also considered. Experimental arrangement to verify the theoretical deductions and also the optimum slicing level formula are given. The results are fully discussed.

3. MICROWAVE CAVITY RESONATORS—SOME PERTURBATION EFFECTS AND THEIR APPLICATIONS. S. K. Chatterjee, *Journal of the British Institution of Radio Engineers*, 1953, **13**, 475.

SUMMARY

Lagrange's equation is utilised to show the analogy of a lossless microwave cavity resonator with the conventional LC network.

A brief discussion on the resonant frequencies of a microwave cavity resonator and the two degenerate companion modes H_{01} and E_{11} appearing in a cavity is given.

The first order perturbation theory of a small deformation of the wall of a cavity is discussed. The effects of perturbation, such as the change in the resonant frequency and the Q of a cavity, the change in the electromagnetic field configurations and hence mixing of modes are also discussed.

An expression for the coupling coefficient between the two degenerate modes H_{01} and E_{11} is derived with the help of the field equations. Results indicate that in the absence of perturbation the above two degenerate modes can co-exist without losing their individual identities.

Several applications of the perturbation theory, such as the measurement of the dielectric properties of matter, study of ferromagnetic resonance, etc., are described.

DEPARTMENT OF METALLURGY

Electrometallurgy Section

1. ELECTRODEPOSITION OF CADMIUM FROM FLUOBORATE SOLUTIONS. T. R. Anantharaman and J. Balachandra, Department of Metallurgy, Indian Institute of Science, Bangalore 3, India, *Journal of the Electrochemical Society*, **100**, No 5, 232–36.

The optimum conditions for electroplating cadmium from its fluoborate solution have been arrived at by a systematic study of the effects of all types of variables on its plating characteristics. The best deposits of cadmium are obtained from a bath containing 210 g./l. of cadmium fluoborate, 25 g./l. of sodium fluoborate, 25 g./l. of boric acid, and 1 g./l. of sodium-beta-naphthalene sulfonate at a pH of 3·2–3·6 and temperatures of 20–30° C., and at current densities of 2·2–6·5 amp./dm² 20–60 amp./ft²). The deposits which are obtained on steel, brass, or copper are uniform, bright, fine grained, adherent, and of pleasing appearance. The current efficiency of the process is 98–100 per cent. cathodic and 102–104 per cent. anodic. The bath is non-poisonous, stable, and easily controlled. The new bath is slightly inferior to the cadmium cyanide bath in the throwing power and resistivity, but vastly superior in all other respects.

2. ELECTROGALVANIZING FROM FLUOBORATE SOLUTIONS. T. R. Anantharaman and J. Balachandra, Department of Metallurgy, Indian Institute of Science, Bangalore 3, India, *Journal of the Electrochemical Society*, **100**, No. 5, 237–39.

The optimum conditions for electroplating zinc from its fluoborate solution have been deduced by a systematic study of the effects of all types of variables on its plating characteristics. The best deposits of zinc are obtained from a bath containing 180 g./l. of zine fluoborate, 30 g./l. of ammonium fluoborate, 25 g./l. of boric acid, and 1·0 g./l. of beta naphthol at a pH of 5·0 to 5·4 and temperatures of 20–30° C., and at current densities of 4·3 to 9·7 amp./dm² (40–90 amp./ft.²). The deposits which are obtained on steel, brass, or copper are uniform, fine grained, adherent, and of pleasing appearance. The current efficiency of the process approximates 98–100 per cent. cathodic and 102–105 per cent. anodic. The bath is non-poisonous, stable, and easily controlled. The new bath is comparable to the zinc cyanide bath, and is vastly superior to the zinc sulfate-bath.

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